ODISHA PUBLIC SERVICE COMMISSION

CUTTACK

NOTICE

No. [illegible] P.S.C. [illegible]

Date [illegible]

1st Addendum to Advt. No. 03 of 2025-26 for Odisha Civil Services Examination 2025

Government in G.A. & P.G. Department have revised the vacancies for OCSE, 2025 by additional [illegible] posts (Odisha Administrative Service-II, Odisha Revenue Service-II, Odisha Welfare Service-II, Odisha Transport Service-II) raising the total vacancy position of Advertisement No. 03 of 2025-26 from [illegible] to **[illegible]**.

1. Hence, the following addendum to Advertisement No. 03 of 2025-26 is hereby issued.

2. The table containing Scale of Pay in respect of different Posts/Services, which is reflected in the first page of the aforesaid advertisement, stands modified accordingly as mentioned below.

Sl. No.	Name of the Posts / Services	Scale of Pay
1	2	3
GROUP-A		
1	Odisha Administrative Service, Group-A (Junior Branch)	Rs. 56,100/- in Level-12 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
2	Odisha Police Service, Group-A (Junior Branch)	Rs. 56,100/- in Level-12 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
GROUP-B		
3	Odisha Revenue Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
4	Odisha Taxation & Accounts Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
5	Odisha Cooperative Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
6	Odisha Skill Development & Employment Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
7	Odisha Labour Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
8	Odisha Excise Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
9	Odisha Tourism Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
10	Odisha Welfare Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
11	Odisha Transport Service, Group-B	Rs. 44,900/- in Level-10 Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.

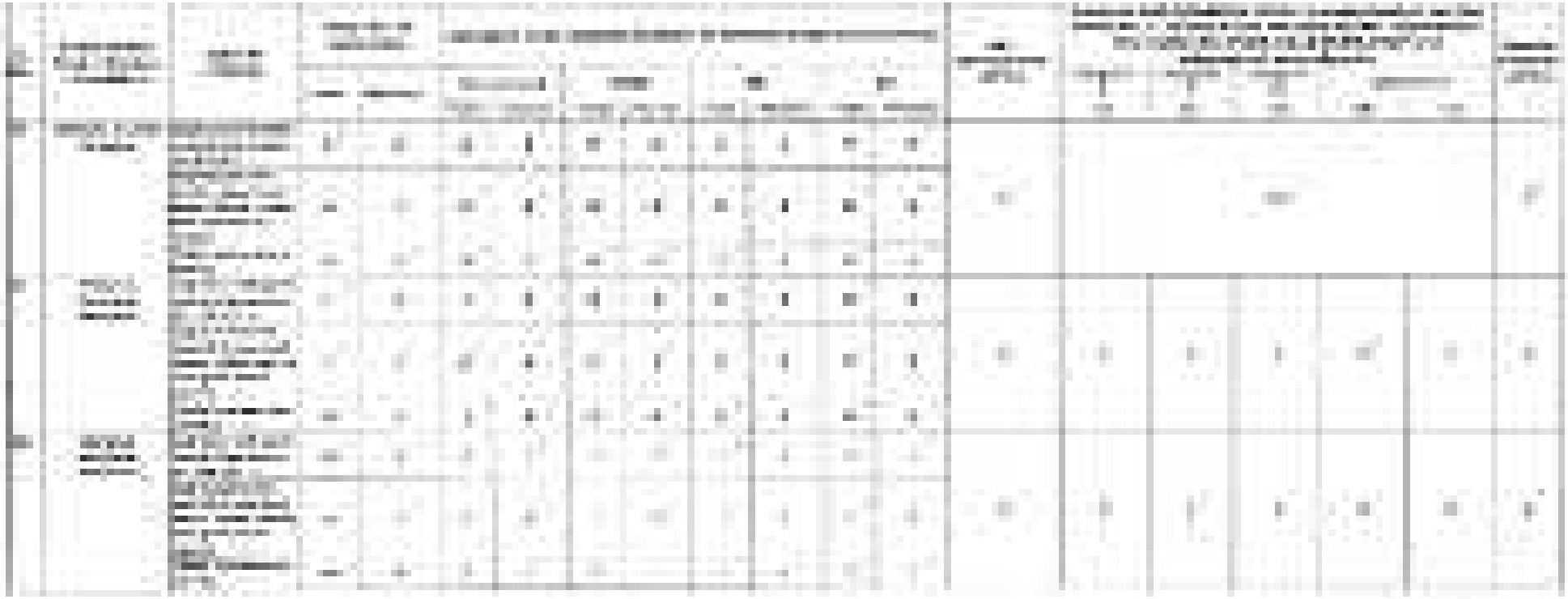
4. **POSITION OF VACANCY AND RESERVATION THEREOF:-**

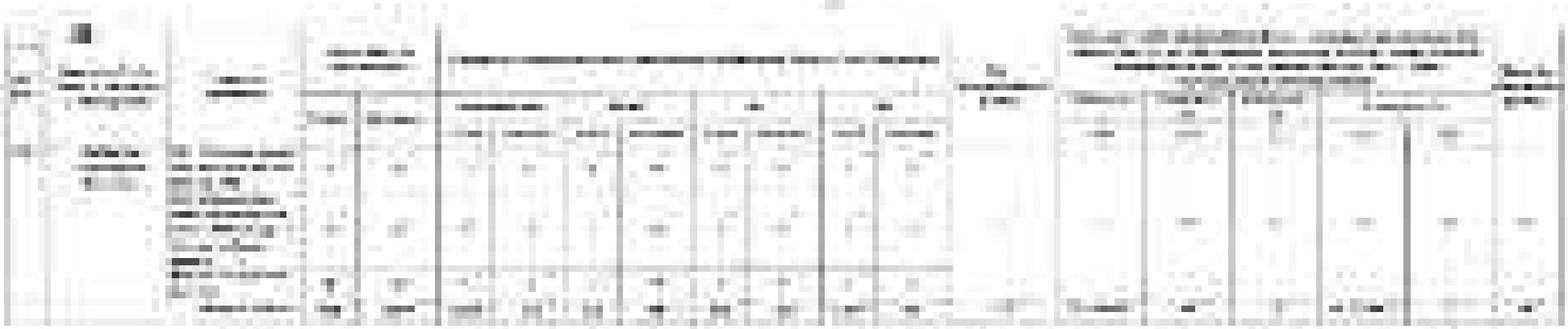
As per the revised requisition of the Govt. here, the vacancy position [illegible] in respect of different Services/Posts along with reservation for each category/sub-category thereof is annexed at **Appendix-A**.

5. Besides this, all other terms and conditions of Advt. No. [illegible] of 2023-24 shall remain unchanged.

SECRETARY

3.[illegible].2024





ODISHA PUBLIC SERVICE COMMISSION

19, DR. P. K. PARIJA ROAD, CUTTACK- 753001

NOTICE

No.8987/PSC, Dt.31.12.2025

ADVERTISEMENT NO.05 OF 2025-26

Website – https://opsc.gov.in

I.	**Odisha Civil Services Examination, 2026**
II.	**No. of Vacancies – 314 (104-w)**

Online applications are invited from the prospective candidates for recruitment to Odisha Civil Services, 2026, through Proforma Application to be made available in the WEBSITE (https://opsc.gov.in). The link for registration and payment of examination fee shall be available from **20.01.2026** to **10.02.2026 (5.00 P.M.).(Note- 27.02.2026 (5.00 P.M.) is the last date for submission of registered Online Application)** for admission to the Odisha Civil Service Preliminary Examination, 2026 in the scale of pay for Group-A Service is Rs.56,100/- in Level-10,Cell-1 in the Pay Matrix & Group-B Service is Rs. 44,900/- in Level-10,Cell-1 in the Pay Matrix provided under Rule-3 of ORSP Rules, 2017.

1. **VACANCY POSITION:** As per requisition filed by the General Administration & P.G. Department, Government of Odisha, **the vacancy position for the post of Odisha Civil Services, 2025 is 314 (104-w).**

2. **AGE LIMIT:** A candidate must have attained the age of 21 years and must not be above the age of 42 years as on the **1st day of January, 2026**, i.e. he/she must not have been born earlier than **2nd January, 1983** and not later than **1st January, 2004**.

3. **EDUCATIONAL QUALIFICATION:** A candidate **must hold a Bachelor's Degree** from any University incorporated by an Act of the Central or a State Legislature in India or an Educational Institution established by an Act of Parliament or deemed to be a University under Section-3 of the University Grants Commission Act, 1956 or a Foreign University approved by the Central Government from time to time.

4. **EXAMINATION FEE:** The candidates **other than SC, ST and PwD** category shall have to pay the examination fee amounting to **Rs. 700/- (Rupees Seven hundred) only** through online mode while filling the Online Application Form. The examination fee **paid shall be refunded only to those candidates who actually appear in the both the papers of the Preliminary Examination. Applications without payment of examination fee (except SC/ST/PwD candidates) will be taken as incomplete and outrightly be rejected.**

Refund shall be issued in due course after completion of the preliminary examination. Refunds will be processed to the original mode of payment used at the time of the transaction by the candidate. (Credit Card, Debit Card, UPI, Net Banking, Wallet, etc.)

5. **METHOD OF SELECTION:**

The Combined Competitive Recruitment Examination shall comprise of the following: -

(A) Preliminary Examination (Objective Type) for the selection of candidates for Main Examination.

There shall be negative marking for wrong answers. **One-third (0.33)** of the marks assigned to a question shall be deducted as penalty.

(B) Main Examination (Written and Interview) for the selection of candidates for the various services and posts.

The details of Plan of Examination, Scheme, Subjects & Syllabus for the Preliminary and Main Examinations is available at Annexure-II, III & V of Long Advertisement.

6. DATE OF EXAMINATION:

The Preliminary Examination of OCS-2022 will be held tentatively on **07.06.2026 (Sunday)**. The detailed Schedule and Centre of Examination will be notified in due course.

7. HOW TO APPLY:

Candidates must go through the detailed Advertisement available in the website of OPSC before filling up of Online Application Form.

Candidates must apply online through the website of OPSC https://opsc.gov.in. Applications received through any other mode would not be accepted and summarily be rejected.

CUTTACK
Dt. 31.12.25

SECRETARY
ODISHA PUBLIC SERVICE COMMISSION
CUTTACK

ODISHA PUBLIC SERVICE COMMISSION
WEBSITE - https://opsc.gov.in

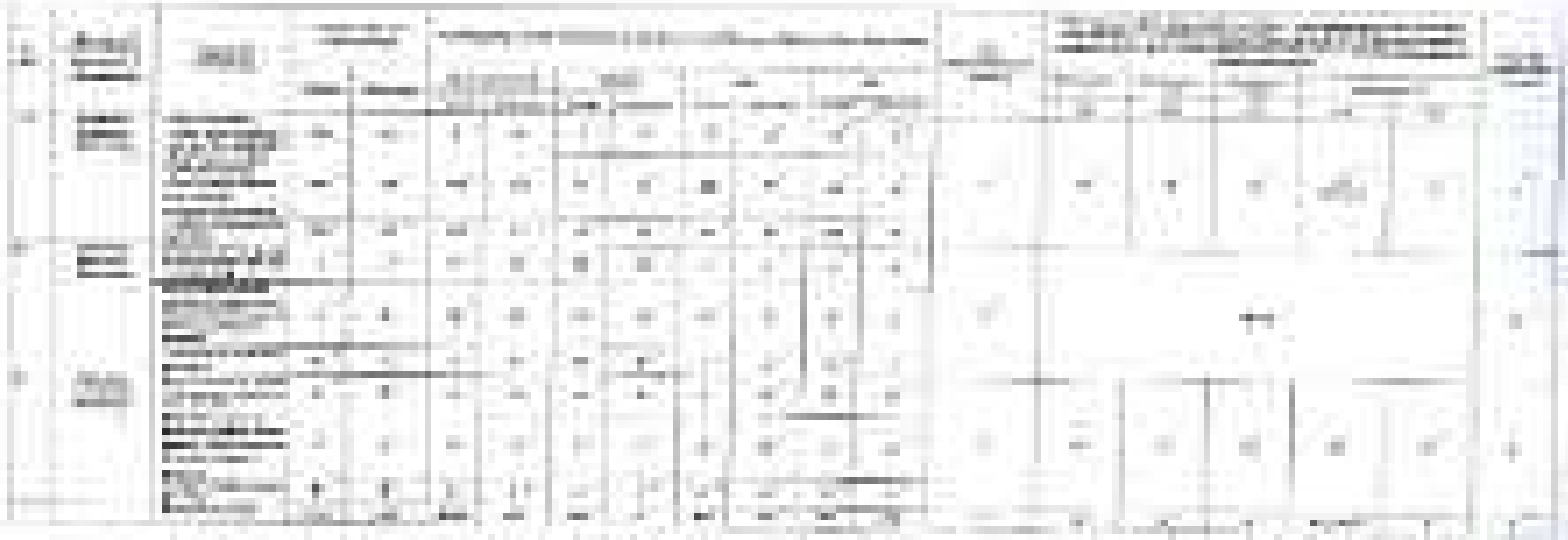
ADVERTISEMENT NO. 05 OF 2025-26.

Odisha Civil Services Examination, 2025.

Online Applications are invited from the prospective candidates through this Proforma Application Form to be made available in the WEBSITE https://opsc.gov.in. The link for **registration and payment of examination fee shall be available from 20.01.2026 to 20.02.2026 (5.00 P.M.) (Note- 27.12.2026 (5.00 P.M.) is the last date/closing date for submission of registered Online Application)** for admission to the Odisha Civil Services Preliminary Examination, 2025 for recruitment to the Posts and Services coming under the Odisha Civil Services (Group-A & Group-B) along with Scale of Pay as mentioned below. The Examination will be conducted in accordance with the provisions of the Odisha Civil Services (Combined Competitive Recruitment Examination) Rules, 1990 as amended from time to time along with Odisha Civil Services (CCRE) (First) Amendment Rules, 2022. The relevant portions of the said Rules are available in the Website of the Commission.

Sl. No.	Name of the Posts/Services	Scale of Pay
1	2	3
	GROUP-A	
1	Odisha Police Service, Group-A (Junior Branch)	Rs. 56,100/- in Level-12/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
	GROUP-B	
2	Odisha Treasuries & Accounts Service, Group-B	Rs. 44,900/- in Level-10/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
3	Odisha Cooperative Service, Group-B	Rs. 44,900/- in Level-10/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
4	Odisha Skill Development & Employment Service, Group-B	Rs. 44,900/- in Level-10/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
5	Odisha Labour Service, Group-B	Rs. 44,900/- in Level-10/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
6	Odisha Excise Service, Group-B	Rs. 44,900/- in Level-10/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.
7	Odisha Tourism Service, Group-B	Rs. 44,900/- in Level-10/Cell-1 in the 1st schedule of Pay Matrix provided under Rule-3 of ORSP Rules, 2017.

At present, only Online Applications are invited from candidates for admission to the OCS Preliminary/Main Written Examination. After declaration of result of Main Written Examination, the candidates, who are called to appear at the Interview/Personality Test, will be required to submit the printout/hard copy of Online Application Form, along with photocopies of other documents as stated under Para-11 of this advertisement on the day of Document Verification, for consideration of their eligibility.



F. NOTE: -

a) **The candidates applying against SEBC Category (Non-Creamy Layer) must submit Caste Certificate issued by the Competent Authority not more than 03 years before the date of submission of Online Application Form.** Candidates furnishing SEBC certificate which is issued more than 03 years prior to the date of submission of Online Application, shall not be considered under SEBC category.

b) PwD Candidates must upload their **Permanent Disability Certificate**. Certificate showing Temporary Disability will not be accepted and the application shall be liable for rejection.

c) Candidates claiming reservation against Sports Person Quota shall submit **Sports Identity Card/ Certificate issued by the Director of Sports, Odisha only** as per General Administration Department Resolution No. 24486/Gen., dt. 18.11.1985. Prizes, Participation Certificates, other Sports Credentials shall not be accepted.

d) As per Rule 2 (1) of Odisha Ex-Servicemen (Recruitment to State Civil Services and Posts) Rules, 1985 – an Ex-Serviceman, amidst other definitions as stated therein, is a person who has to serve for not more than six months for completing the period of service as a requisite for becoming entitled to be relieved or transferred to the reserve. Further, according to the Odisha Ex-Servicemen (Recruitment to State Civil Services and Posts) Amendment Rules, 2021 issued vide General Administration and Public Grievance Department Notification No. 15018/Gen., dt. 05.06.2021, those Ex-Servicemen who have already secured regular employment under the State Government in civil posts and services **shall not be eligible for benefit of reservation** if any, for Ex-Servicemen in the State Government. But, they would be permitted the benefit of age relaxation as admissible for Ex-Servicemen for securing another employment in any higher post or service under the State Government.

e) Experience has shown that, some candidates obtain SC/ST/SEBC certificates etc. immediately ahead of the date of Application and upload the same along with Online Application, only to secure admission to the examination, which could later get cancelled subsequently on the grounds of inadmissibility or fraud etc. If any such cancellation of any uploaded certificate is detected at any stage of the recruitment examination, the candidature of such candidates will be cancelled under that category and punitive measure as deemed shall be taken against him/her.

f) In case of non-availability of eligible/suitable women candidates belonging to the respective categories, the unfilled vacancies of that category shall be filled up by eligible & suitable male candidate(s) of the same category.

g) Exchange of reservation between Scheduled Caste and Scheduled Tribe will not be considered in the event of non-availability of eligible and suitable S.C. / S.T. candidates.

h) The number of vacancies to be filled up on the basis of this recruitment is subject to change by the Government without notice, depending upon the exigencies of public service at the discretion of the State Government.

3. **ELIGIBILITY:**

(i) **Citizenship:**

A candidate must be a citizen of India.

(ii) **Age limits:**

A candidate must have attained the age of 21 years and must not be above the age of 40 years as on the 1st day of January, 2025, i.e. he/she must not have been born earlier than **2nd January, 1985** and not later than **1st January, 2004**.

The upper age limit is relaxable by 05 (Five) years for candidates belonging to S.C./S.T./S.E.B.C./ Women/ Ex-Serviceman and by 10 (ten) years for Persons with Disabilities whose **permanent disability is 40% or more.**

Persons with Disabilities belonging to SC/ST/SEBC categories are eligible for cumulative age relaxation benefit.

SAVE AS PROVIDED ABOVE THE AGE LIMITS PRESCRIBED CAN IN NO CASE BE RELAXED.

Date of birth entered in the High School Certificate or equivalent Certificate issued by the concerned Board/Council will be accepted by the Commission.

NOTE: - Candidates should also note that once a Date of Birth has been claimed by them and entered in the records of the Commission for the purpose of admission to an examination, no change will be allowed subsequently on any grounds whatsoever. If, on verification at any subsequent stage, any variation is found in their date of birth from the one entered in their High School Certificate or equivalent certificate, the candidature of the candidate concerned, will be rejected and or she/he may be debarred from present and future recruitments.

(iii) **EDUCATIONAL QUALIFICATION**

A candidate **must hold a Bachelor's Degree** from any University incorporated by an Act of the Central or a State Legislature in India or an Educational Institution established by an Act of Parliament or deemed to be a University under Section-3 of the University Grants Commission Act, 1956 or a Foreign University approved by the Central Government from time to time.

4. EXAMINATION FEE, MODE OF PAYMENT & REFUND:

As per Odisha payment of recruitment examination fees and Refund Rules, 2015 published vide Government in G.A. & P.G. Department Notification No. 31124-GAD-SC-rules-0030/2021/Gen. dated 10.10.2015, **the candidates other than SC, ST and PwD category shall have to pay the Examination fees.**

The candidates other than SC, ST and PwD category shall have to pay the examination fee amounting to **Rs. 700/- (Rupees Seven hundred) only** through online mode while filling the Online Application Form. The examination fees paid shall be **refunded only to those candidates who actually appear in both the papers of the Preliminary Examination. Applications without payment of examination fees (except SC/ST/PwD candidates) will be taken as incomplete and outrightly be rejected.**

Refund shall be issued in due course after completion of the Preliminary Examination. Refund will be processed to the original mode of payment used at the time of the transaction by the candidate. (Credit Card, Debit Card, UPI, Net Banking, Wallet, etc).

However, the candidates shall have to furnish their bank account details i.e. Account Number, IFSC Code, Name of the Account Holder and Name of the Bank branch in the required field in the Online Application Form which will be required in case of failure of refund of money through the original mode of payment owing to technical glitches or other issues, if any. The Bank Account must remain valid/active. The onus of furnishing the correct bank account details lies with the candidates and the Commission (OPSC) shall not entertain any correspondence from any candidate in this regard.

9. OTHER ELIGIBILITY CONDITIONS

(i) A candidate must be able to read, write and speak Odia and have

(a) Passed Middle School Examination with Odia as a Language subject; or

(b) Passed High School Certificate or equivalent examination with Odia as medium of examination or as one language subject; or

(c) Passed in Odia as a language subject in the final examination of Class-VII from a School or Educational Institution recognized by the Government of Odisha or the Central Government; or

(d) Passed a test in Odia in Middle English School Standard conducted by the School & Mass Education Department of the Government of Odisha.

(ii) A candidate, who has more than one spouse living or in case of a woman candidate, if married to a person having one spouse living, shall not be eligible for appearing at the examination, unless the State Government has exempted his/her case from operation of this limitation for any good and sufficient reasons.

(iii) Government Servants, whether temporary or permanent, are eligible to apply provided that they possess the requisite qualifications and are within the prescribed age limit as provided under Para-3 of the Advertisement, failing which their candidature is liable to be rejected. All candidates are required to obtain an NOC (**No Objection Certificate**) from their Competent Authority and attach it with the online application form at the time of submission of documents. **They must inform their respective Heads of Departments in writing requesting suitable action of their application for this recruitment and obtain 'No Objection Certificate' well in advance.**

(iv) If a candidate has, at any time, been debarred for a certain period/term(s) by the Odisha Public Service Commission or other State Public Service Commission or U.P.S.C. from appearing at any Examinations/Interviews, he/she **will not be eligible** for such recruitment for that specified period/term(s).

(v) **Only those candidates, who possess the requisite qualification and fulfill other eligibility conditions by the closing date of submission of online applications will be considered eligible.**

(vi) The period of probation will be as applicable as prescribed in the recruitment rules of different services.

(vii) A candidate must have good moral character. He/She must be of good mental condition and bodily healthy and free from any physical defect likely to interfere with the discharge of his/her duties as an officer of the Service/Post. A candidate, who, after such medical examination, as the Government may prescribe, is not found to satisfy these requirements, will not be appointed.

(viii) A candidate who claims change in his/her name after having passed the High School Certificate Examination or equivalent examination, is required to furnish copies of publication of the changed name in local leading daily newspapers as well as copy of notification in the Gazette in support of his/her change of name.

6. PLAN AND CONDUCT OF EXAMINATION

The Combined Competitive Recruitment Examination shall consist of the following successive stages as per Schedule-I (Rule 4(3) of DCS(CCRE) (Amd) Amendment Rules, 2022) :-

i. Preliminary Examination (Objective Type) for selection of candidates for Main Examination; and
ii. Main Examination (written and Interview) for the selection of candidates for the various Services and posts.

The **Preliminary Examination** shall consists of two Compulsory Papers of Objective Type (Multiple Choice) Questions carrying a maximum of 200 marks each in the subjects set out in Section-I of SCHEDULE-I of DCS(CCRE) (Amd) Amendment Rules, 2022 (**ANNEXURE-III**), and each paper shall be of (02) two hours duration.

(a) General Studies - Paper-I - 200 marks
(b) General Studies - Paper-II - 200 marks

The marks obtained in the Preliminary Examination by the candidates who are declared qualified for admission to the Main Examination shall not be counted for determining their final order of merit.

The Commission shall draw a list of candidates to be qualified for Civil Services (Main) Examination based on the criterion of **only those qualifying marks of 33% in General Studies Paper-II** of Civil Services Preliminary Examination and total qualifying marks of General Studies Paper-I of Civil Services (Preliminary) Examination as may be determined by the Commission as mentioned in Schedule-I(4- Notes of DCS(CCRE) (Amd) Amendment Rules, 2022 (**ANNEXURE-III**).

The number of candidates to be admitted to the Main Examination **will be nearly as possible but not more than 12 times of the total number of vacancies to be filled in the year through this examination.**

There shall be **negative marking** for incorrect answers (no deduction) believe for all questions except some of the questions where the negative marking shall be stated in the form of different marks being awarded to the most appropriate and not so appropriate answer for such questions) :-

(i) There shall be four alternatives for the answers to every questions. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** of the marks assigned to that question shall be awarded as penalty.

(ii) If a candidate gives more than one answer, it shall be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above for that question.

(iii) If a question is left blank i.e. no answer is given by the candidate, there shall be no penalty for that question.

Note: It is mandatory for the candidate to appear in both the Papers of Preliminary Examination for the purpose of evaluation. Therefore, a candidate shall be disqualified in case he or she does not appear in both the papers of Preliminary Examination.

The **Main Examination** shall consist of written test and an interview test. The written examination shall consist of nine papers of conventional essay type in the subjects set out in Section 2 of SCHEDULE-II, in which there shall be two papers in Part-I which are qualifying in nature and seven papers in part-II for assessment of merit of the candidate. Detail syllabus for papers in part-II forms a part of this advertisement at **Annexure-V**. Marks obtained for all the Compulsory Papers (Paper-I to Paper-V in part-II) and Optional Papers (Paper-VI & VII in part-II) and Marks obtained in Interview for Personality Test shall be counted for ranking.

Candidates who obtain such minimum qualifying marks in the Part-II of the written part of the Main Examination as may be fixed by the Commission at their discretion, shall be called by them for an interview for a Personality Test, as provided in Section-3 of SCHEDULE-II. After Main Examination, the number of candidates to be called for interview shall be about twice of the number of vacancies to be filled. The interview shall carry [illegible] marks (with no minimum qualifying marks).

Marks thus obtained by the candidates in the Main Examination (written as well as interview) shall determine their final ranking. Candidates shall be allotted to the various Services keeping in view their ranks in the examination and the preferences expressed by them for the various Services and posts.

Evaluation of the papers, namely 'Essay', 'General Studies' and Optional Subjects, of all the candidates shall be done simultaneously along with evaluation of their qualifying papers on 'Hindi' and 'English' language in Part-I, but the papers on Essay, General Studies and Optional Subject of only such candidates shall be taken cognizance who obtain **30% marks in 'Hindi' and 'English' Language each in Part-I** as minimum qualifying standards in these qualifying papers.

The Main Examination shall carry [illegible] marks including [illegible] marks for Interview/Personality Test.

The details of Plan of Examination reflected in Schedule-II, Scheme, Subjects & Marks for the Preliminary and Main Examinations as reflected in Schedule-III of [illegible] Amendment Rules, 2022 and Syllabus for the Preliminary Examination and Main Examination are appended as <u>ANNEXURE-[illegible] & ANNEXURE-V</u> respectively to this Advertisement.

The details of medium of language for answering the papers in Written Examination and appearing Personality Test is appended as **<u>ANNEXURE-[illegible]</u>** to this Advertisement.

Note: Any details relating to this recruitment like cut-off marks, answer keys, individual marks etc. shall only be declared on the website of the Commission after publication of the final results and select list.

7. **DATE OF EXAMINATION:**

The Preliminary Examination of OCS-2023 will be held tentatively on **07.06.2026 (Sunday)**. The detailed Schedule and Centre of Examination will be notified in due course.

After completion of the Preliminary Examination, the Provisional Answer Key to both the Papers shall be uploaded in the website within 10 days of the examination, inviting suggestions/objections, if any, from the candidates. Those candidates who do not challenge the Provisional Answer Key shall forfeit their right to agitate the matter subsequently in any forum in any other manner.

8. **ZONE(S) OF EXAMINATION:**

Both Preliminary and Main Examination will be held at Six Zonal Centres of the State, viz. Balasore, Berhampur, Bhubaneswar, Cuttack, Jeypore and Sambalpur depending on the number of candidates from the respective areas. Candidates are **required to select any two zones of their choice** where they would like to appear at the Examination, during filling up of Online Application Form. While every effort will be made to allot candidates to the zones of their choice **on First Come First Serve basis**, the Commission may, at their discretion, allot any other zone to the candidates when circumstances so warrant. **REQUEST FOR CHANGE OF ZONE WILL NOT BE ENTERTAINED.** The Candidates are not allowed to appear at a centre other than the one indicated by the Commission.

9. **NUMBER OF ATTEMPTS:**

Every candidate appearing at the Civil Services Examination, who is otherwise eligible, shall be permitted **Six (six)** attempts at the examination. Provided that –

(i) There shall be **no such limit** for the S.C. and S.T. candidates.

(ii) The number of attempts permissible to candidates belonging to Visually & Locomotively Disabled Classes, who are otherwise eligible, shall be **09 (nine)**. This relaxation will be available to the candidates, who are eligible to avail reservation applicable to such candidates.

"Provided further that, save the relaxation of upper age limit to withdraw the number of attempts admissible under this rule shall not be permitted in any circumstances".

NOTE: 1. An attempt at a Preliminary Examination shall be deemed to be an attempt at the Examination.

2. If a candidate actually appears in any one paper in the Preliminary Examination, he/she shall be deemed to have made an attempt at the Examination.

10. **IMPORTANT POINTS:**

(i) The provisions of the Odisha Conduct of Examinations Act, 1988 (Odisha Act-I of 1989) are applicable to this Examination (Preliminary & Main) conducted by the Odisha Public Service Commission. Any violation of the above Act and violation of "**Instructions to candidates**" (as provided in the advertisement, application form, brochure, Admission Certificate & Answer Script etc.) will be seriously viewed and disciplinary action will be taken against the concerned candidates as deemed proper.

(II) The provisions of penalty under Rule-18 of Odisha Civil Services (Combined Competitive Recruitment Examination) Rules, 1991 shall also be applicable.

(III) A candidate found guilty of seeking support for his/her candidature by offering illegal gratification or applying pressure on any person connected with the conduct of the recruitment process or found indulging in any type of malpractice in course of the selection or otherwise, shall in addition to rendering himself/herself liable to criminal prosecution, be disqualified not only for the recruitment for which he/she is a candidate, but also may be debarred, either permanently or for a specified period, from any recruitment or selection to be conducted by the Commission.

(IV) **Reservation and Relaxation etc. meant for S.C. / S.T. by birth and SEBC are admissible to the Scheduled Castes / Scheduled Tribes and Socially & Educationally Backward Classes of Odisha only.**

(V) **Community (caste status) once mentioned by the candidates under the appropriate box of the online application form, will be treated as final and the same shall not be changed subsequently under any circumstances.**

(VI) This advertisement should not be construed as binding on the Government to make appointment.

(VII) **Any misrepresentation or suppression of information by the candidate in the online application, will result in cancellation of his/her candidature or penalty, as decided by the Commission be imposed on the candidate.**

(VIII) Mere empanelment in the select list shall not confer any right for appointment unless the Government is satisfied after making such enquiry as may be deemed necessary that the candidate is suitable in all respects for appointment to the Service.

(IX) No request for withdrawal of candidature and change of category will be entertained under any circumstances.

(X) **The candidates are advised to be very careful while filling up of the Services/Post Preference for OCSE-2023. No separate correspondence for change of opted/ wrongly filled up Post Preference after submission of Online Application Form by the candidate shall be entertained under any circumstances whatsoever.**

(XI) Candidates must answer the Papers in their own handwriting. Only PWD candidates who are unable to write will be allowed to take help of scribe to write the answers for them by giving option while **filling up the Online Application** subject to the provisions made under Para (3)(i) of the SSEPD Department Resolution No. 10418/SSEPD, dt.25.07.2023.

(XII) All persons appointed under the Government of Odisha on or after 1st January, 2005 shall not be eligible for pension as defined under sub-rule (1) of Rule-3 of the Odisha Civil Services (Pension) Rules, 1992, but shall be covered by the defined Contributory Pension Scheme in accordance with the Odisha Civil Services (Pension) Amendment Rules, 2005.

(XIII) **Submission of NPS application is mandatory for all recommended candidates at the time of joining in Govt. Services.**

(XIX) The Commission reserves the right to adopt the methods and principle of evaluation of answer scripts of both the Preliminary and Main Examinations.

(XX) All candidates who have opted for the Odisha Police Service are required to undergo a Physical Standard Test as per Home Department Notification No. 29412/PSC, Dt.04.07.2011. (Annexure-IV).

(XXI) **Online applications submitted to OPSC, if found to be incomplete in any respect, are liable to rejection without entertaining any correspondence with the applicants on that score.**

(XXII) **Admission to Examination/ Interview will be provisional. If on verification at any stage before or after the Examination/Interview/ Publication of Result, it is found that a candidate does not fulfil all the eligibility conditions, his/her candidature will be liable for rejection. Decision of the Commission with regard to eligibility or otherwise of candidate shall be final.**

(XXIII) Candidates are required to bring the copies of certificates and other requisite documents as stated under **Para-11** of this Advertisement at the time of Document Verification.

11. **CERTIFICATES/DOCUMENTS TO BE ATTACHED:**

Candidates who qualify in the Main Written Examination and called for Document Verification should be in readiness to submit the Hard copy of Online Application Form, along with true copies of the following documents duly self certified.

The candidates are required to mention on each copy of documents "**Submitted by me and Certified as genuine and has not been cancelled**" and put their full signature and date on the same. They must not attach the Original Certificates with their hard copy of Online Applications. Only those who are called for the Personality Test or Interview will be required to bring with them the Original Certificates on the day of verification as decided by the Commission, **failing which he/she shall not be allowed to appear at the Personality Test or Interview, and his/her candidature will be rejected. A notice to this effect will be issued later on.**

(a) H.S.C. or equivalent Certificate in support of declaration of age issued by the concerned Board/Council.

(b) +2/ Intermediate or equivalent certificate issued by concerned Board/Council.

(c) Bachelor's Degree Certificate issued by the concerned University.

(d) Certificate of any other higher qualification(s) issued by the University/Institution.

(e) Mark-lists of all Semesters / Annual Examination in support of all the aforesaid examinations (H.S.C. to Bachelor's Degree) passed including Toil marks, if any, issued by the concerned Board/Council/University.

NOTE-I:

(i) Candidates who have not been awarded percentage of marks, but only "GRADE MARKS", should, along with their applications, produce the Conversion Certificate from the concerned University indicating the actual equivalent percentage of marks and the conversion formula, failing which, their applications are liable to be rejected.

(iii) While filling up the relevant box of the Online Application Form, candidates have to mention the marks (Excluding the marks secured in the Extra Optional / 4th Optional Subject) in the examinations passed (HSC to Degree).

(f) Caste Certificate in support of claim as S.C./S.T. **by birth** and S.E.B.C., wherever applicable (Please see Note-2-Para 1).

(g) Required Odia Test Pass Certificate from the Competent Authority, wherever applicable (Please see Note-3-Para 1).

(h) **Ex-Servicemen are required to submit/upload Release Certificate issued as per Odisha Ex-Servicemen (Recruitment to State Civil Services and Posts) Rules, 1985 vide G.A. Department notification No.25580-Gen., dt.18.10.1991.** Further, Ex-Servicemen candidates must submit an affidavit, undertaking that he/she has not been appointed against any civil posts and services after retirement from military service **(Refer Note-(d) under Para 3). Format of Affidavit is enclosed at ANNEXURE-I.**

(i) Permanent Disability Certificate (indicating percentage of disability, i.e. 40% or more) issued by the concerned Medical Board, wherever applicable.

(j) Sports Certificate/Identity Card, issued by the Director of Sports, Odisha only. Photo, Participation Certificates, other Sports Credentials shall not be accepted.

(k) If a candidate claims to possess qualification, equivalent to the prescribed qualification, the notification/rule (with number & date) under which it is so treated, must be furnished with the hard copy of the Online Application.

(l) Certificate of good character from the Principal/Proctor/ Dean or Professor in charge of Department of Teaching of the College or University/ Institution in which last studied.

(m) Four recent passport size photographs (within six months) **unsigned & unattested** which has been uploaded with online application form.

(n) No Objection Certificate from their competent authorities in case of Government servants.

(o) Proof of identity i.e. Aadhar / EPIC/ DL/ Passport/PAN Card.

NOTE -2:

i. **Candidates claiming to be belonging to the S.C. /S.T. categories of Odisha by birth & S.E.B.C. are required to submit copy of the relevant Caste Certificate issued by the competent authority in the prescribed form.**

ii. **The candidates applying against SEBC Category (Non-Creamy Layer) must submit Caste Certificate issued by the Competent Authority not more than 03 years before the date of submission of online application form. For example, if a candidate is submitting the online application on 21.11.2025, the SEBC certificate must have been issued on or after 22.11.2022. If such certificate is issued before 22.11.2022 will not be treated as valid and the candidate will not be considered under SEBC category.**

iii. **Women candidates belonging to S.E.B.C. / S.C. / S.T. categories are required to submit Caste Certificates showing "daughter of ....". Caste Certificates by virtue of marriage (i.e. showing "wife of ....") are not acceptable and liable for rejection.**

iv. OBC certificate will not be accepted in lieu of SEBC certificate.

v. Community (Caste status) once mentioned by the candidates in the online application form shall not be changed under any circumstances.

The Competent Authorities are as prescribed by the Government of Odisha under relevant Reservation Rules.

NOTE-3:

Bachelor's Degree Certificate, SC/ST Caste Certificate, Odia Test Pass Certificate, Sports Identity Card issued by the Director of Sports, Odisha in case of Sports Persons, Permanent Disability Certificate of Person with Disabilities (indicating % of permanent disability) and Release Certificate of Ex-Serviceman (issued as per Orissa Ex-Servicemen (Recruitment to State Civil Services and Posts) Rules, 1989 vide G.A. Department notification No.21586-Gen., dt.16.10.1989) must have been issued by the Competent Authority on or before the last date of submission of the registered Online Application Form by the candidate. Any such certificates issued after the last date for submission of Online Application Form will not be entertained to consider eligibility.

12. GROUNDS OF REJECTION OF APPLICATIONS: -

Applications of candidates will be **rejected** on any of the following grounds-

a) Incomplete online application form.

b) Declaration not signed (full signature) by the candidate in the hard copy of online application form.

c) Age limit of candidates not coming under Para-3(b) of the Advertisement. (Relaxable relaxation shall not be allowed to PWD candidates having **less than 40% disability**).

d) No required Education Qualification as provided under Para-3(d) of the Advertisement.

e) Non furnishing copies of Certificates/Documents etc. as provided under Para-11 of this Advertisement.

f) Odia Test (HE standard) not passed/Odia Test pass evidence not furnished, as required under Para-4(j) of the Advertisement.

g) Applications without payment of examination fees (except SC/ST/PwD candidates) will be taken as incomplete and outrightly be rejected.

h) Submission of wrong information/false information about qualification/ age/Odia Test Pass evidence/category status (SC/ ST/SEBC/ PWD/Sports Person/Ex-servicemen/Women etc).

i) Ineligible applications which are violative of the provisions in Para-6 of the Advertisement regarding No. of attempts.

j) Suppression of facts/information about eligibility, if Any.

k) Any other grounds as per the decision of the Commission.

l) If a candidate fails to furnish any of the Original Certificates and Documents for verification on the date fixed by the Commission.

n) Application received through any other mode (except online through the proforma Application to be made available on **WEBSITE OF OPSC**).

o) Non-submission of equivalence certificate issued by concerned University/Board.

N.B.: Application/candidature of a candidate shall be rejected at any stage of recruitment process, whenever discrepancy is noticed/ detected.

13. HOW TO APPLY

a. Candidates must carefully go through the details of this Advertisement available in the Website of OPSC before filling up online application form.

b. Candidates must apply online through the concerned Address of the OPSC **(http://www.opsc.gov.in)**. Applications received through **any other mode** would not be accepted and summarily rejected.

c. **Before filling up the Online Application Form, the candidates must go through detailed instructions available at OPSC portal.**

d. The Online Application Form is automated and system driven & will guide the candidate seamlessly in filling the application. The requisite options shall be enabled and information shall be asked as per data furnished by the candidate. Before filling up the information, ensure that accurate information is fed. The candidate must also verify the submitted copy of Online Application after its submission. If the candidate further wants to modify any information, she/he has to cancel the Application and apply again within the last date of submission of Application.

e. Candidates are requested to upload the scanned image of latest passport size photograph along with scanned image of his/her full signature and scanning image of Left/Hand Thumb Impression (LTI) in the online application form. Uploaded photograph, Specimen (full) signature and LTI must be clearly identifiable / visible, otherwise the application of the candidate is liable to be rejected by the Commission and no representation from the candidate will be entertained.

f. Candidates should keep at least four copies of latest passport size photograph which is uploaded to the online application form for future use.

g. *On successful submission of the online Registration, a unique "**Permanent Public Service Account Number (PPSAN)**" will be assigned to the applicant. Candidates are required to take a printout of the finally submitted online Application for the application and finally submitted Online Application Forms and put his/her signature under the declaration for submission to OPSC along with copies of requisite certificates & documents as and when asked.*

h. **The candidates are advised to submit the Online Application Form well in advance without waiting for the closing date to avoid the last hour rush**

i. Admission certificate to the eligible candidates of OCS Preliminary Examination and Main written examination will be uploaded in the Website of the OPSC prior to the date of Preliminary & Main written examination. The date & Programme of the Preliminary & Main written examination will be published in the Website of the Commission and Newspapers. The candidates are required to download their Admission Certificate/ Instructions for Candidates from the Website. No separate correspondence will be made in this point.

j. "NOTICE" to candidates for document verification & interview shall be uploaded in the website of OPSC prior to the date of Document Verification/Interview.

k. **Any complaint** on the conduct of examination may be sent to the Grievance Wing of the Commission by e-mail ([illegible]) within **07(Seven) days of completion of the examination.**

l. **Experience has shown that the candidates do submit Online Application Form with omission/error/without uploading documents and subsequently send e-Mail/letter to the Commission for rectification. The Commission is under no obligation to entertain such request/representation.**

14. **FACILITATION COUNTER AND WEBSITE FOR GUIDANCE OF CANDIDATES:-**

For any Technical guidance for filling up of the Online Registration and Online Application Forms, candidates may contact OPSC **Technical Support** over Telephone **No. 0671-2304707** between 10.30 A.M. to 01.30 P.M. & 2.00 P.M. to 5.00 P.M. of any Odisha Government working days.

In case of any guidance/information on this Advertisement and recruitment, candidates may refer to **Para-13** of this Advertisement or go through the **FAQ** available in the website of the Commission or contact the O.P.S.C. Facilitation Counter over Telephone No.[illegible] & [illegible] on any Odisha Government working day between 10.30 A.M. to 1.30 P.M. & 2.00 P.M. to 5.30 P.M.

The candidates are required to visit the website of the Commission at **http://opsc.gov.in** for detailed information about important Notices, rejection of Applications, date & time of Examination/Interview, etc. and also to keep track of publication of various Notices to this effect in the leading local dailies for information.

15. **GENERAL:**

Candidates submitting forged/manipulated documents will be debarred from appearing examination conducted by Odisha Public Service Commission for 03 years.

CLOSING DATE

(A) THE LINK FOR REGISTRATION AND PAYMENT OF EXAMINATION FEES SHALL BE AVAILABLE IN THE WEBSITE FROM **28.01.2026** TO **28.02.2026 (5.00 P.M.)** (NOTE: - **27.02.2026 (5.00 P.M.)** IS THE LAST DATE FOR SUBMISSION OF REGISTERED ONLINE APPLICATION FORM).

(B) ONLY ONLINE APPLICATIONS RECEIVED WITHIN THE DEADLINE i.e. **27.02.2026 (5.00 P.M.)** SHALL BE ACCEPTED.

NB: THE ONLINE APPLICATION FORM IF FOUND DEFECTIVE IN ANY RESPECT ARE LIABLE TO BE SUMMARILY REJECTED.

CUTTACK
Dt. 27.12.25

SECRETARY
ODISHA PUBLIC SERVICE COMMISSION,
CUTTACK

ANNEXURE-I

AFFIDAVIT

I ..... S/O ..... aged about ..... years, resident of ..... Roll No. ..... for mental tone to the post of ..... do here by solemnly affirm and declare as under:

1. That I am the deponent of the affidavit and permanently residing at .....
2. That I have been released from Military Service on .....
3. That since then I am working at ..... under the Department of ..... Govt. of Odisha/Govt. of India

OR

That since then I am working as ..... at .....

OR

That I have not secured regular employment in any Civil Posts and Services under Government of Odisha.

4. That this affidavit shall be produced before the Competent Authority, Odisha Public Service Commission, Cuttack for the purpose of being considered in service under the Ex-Servicemen quota/ not under Ex-Servicemen quota and hence this affidavit.
5. That the facts stated are true to the best of my knowledge, belief and information.

Deponent

Place:
Date:

Verification

I the above named deponent being present today before the .... personally do hereby verify and declare that above statements are all true and correct to the best of my knowledge and belief.

Verified

I identify the deponent

N.B: Strike off the portion which is not applicable.

Annexure-I

The Odisha Gazette

EXTRAORDINARY
PUBLISHED BY AUTHORITY

No. 3008 CUTTACK, WEDNESDAY, OCTOBER 19, 2022 / ASWINA 27, 1944

GENERAL ADMINISTRATION & PUBLIC GRIEVANCE DEPARTMENT

NOTIFICATION

The 18th October, 2022

No.20049-GAD-SC-RULES-0015/2022/Gen.– In exercise of the powers conferred by the proviso to Article 309 of the Constitution of India, the Governor of Odisha is pleased to make the following rules to regulate the method of recruitment in different Civil Services and posts of the State, namely:-

1. Short title and commencement.— (1) These rules may be called the Odisha Civil Services (Method of Examination in Odia Medium) Rules, 2022.

(2) They shall come into force on the date of their publication in the Odisha Gazette.

2. Definitions.— (1) In these rules, unless the context otherwise requires,—

(a) "State Government" means the Government of Odisha;

(b) "recruitment examination" means the method of examination prescribed in different recruitment Rules; and

(c) "Recruitment Rules" means the rules framed under the proviso to Article 309 of the Constitution of India regulating the appointment to different State Civil Services and Posts and includes executive orders and instructions issued by the Competent Authority in this regard from time to time.

(2) All other words and expressions used in these rules but not specifically defined shall, unless the context otherwise requires, have the same meaning as respectively assigned to them in the Odisha Service Code.

3. Notwithstanding anything contained in any Recruitment Rules, all recruitment made through the written examination and the Viva-voce, if any, shall be both in Odia and English except the Language subject.

4. The candidate shall answer the questions in Odia language except the language subject :

Provided that the candidate who desires to answer the papers and to face the Viva-voce, if any, in English language, shall exercise his option at the time of filling up the Application form for the examination which cannot be changed:

Provided further that the candidate while answering the papers in Odia language may, if he so likes, indicate the technical terms in English.

By Order of the Governor
SURENDRA KUMAR
Principal Secretary to Government

Printed and Published by the Director, Printing, Stationery and Publication, Odisha, Cuttack-10
OGP/SBP Ex Gaz 2376-183+200

The Odisha Gazette

EXTRAORDINARY
PUBLISHED BY AUTHORITY

No. 2961 CUTTACK, TUESDAY, OCTOBER 18, 2022 / ASWINA 26, 1944

GENERAL ADMINISTRATION & PUBLIC GRIEVANCE DEPARTMENT

NOTIFICATION

The 18th October, 2022

No.20230-PTG-GAD-SC-RULES-0025/2017Gen.– In exercise of the powers conferred by the proviso to Article 309 of the Constitution of India, the Governor of Odisha is pleased to make the following rules further to amend the Odisha Civil Services (Combined Competitive Recruitment Examination) Rules, 1991, namely:—

1. Short title and commencement.— (1)These rules may be called the Odisha Civil Services(Combined Competitive Recruitment Examination) (third) Amendment Rules, 2022.

(2) They shall come into force on the date of their publication in the Odisha Gazette.

2. In the Odisha Civil Services (Combined Competitive Recruitment Examination) Rules, 1991(hereinafter referred to as the said rules), in rule 12,—

(i) for the word "four", appearing after the word "permitted", and before the word "attempts", the word "six" shall be substituted;

(ii) in the proviso, in item (i), for the word "seven", the word "nine" shall be substituted; and

(iii) after the first proviso, the following proviso shall be inserted, namely:—

"Provided further that claim for relaxation of upper age limit to enhance the number of attempts admissible under this rule shall not be permitted in any circumstances".

3. In the said rules, for "Schedule-II" and "Schedule-III", the following Schedules shall be substituted, namely:—

"SCHEDULE-II

[See rule 4(2)]

PLAN OF EXAMINATION

The Combined Competitive Recruitment Examinations shall comprise of the following:—

(A) Preliminary Examination (Objective Type) for the selection of candidates for Main Examination; and

(B) Main Examination (Written and Interview) for the selection of candidates for the various Services and posts.

A. PRELIMINARY EXAMINATION

The Preliminary Examination shall consist of two papers of Objective Type (multiple choice) questions and carry a maximum of 200 marks each in the subjects set out in sections 1 of SCHEDULE III. This examination is meant to serve as a screening test only. The marks obtained in the Preliminary Examination by the candidates who are declared qualified for admission to the Main Examination shall not be counted for determining their final order of merit. The number of candidates to be admitted to the Main Examination will be as nearly as possible but not more than twelve times of the total number of vacancies to be filled in the year through this examination. Only those candidates who are declared by the Commission to have qualified in the Preliminary Examination in the year shall be called to appear in the Main Examination of that year provided they are otherwise eligible for admission to the Main Examination.

Note I: The Commission shall draw a list of candidates to be qualified for Civil Services (Main) Examination based on the criterion of minimum qualifying marks of 33% in General Studies Paper-II of Civil Services (Preliminary) Examination and total qualifying marks of General Studies Paper-I of Civil Services (Preliminary) Examination as may be determined by the Commission.

Note-II: There shall be negative marking for incorrect answers (as detailed below) for all questions except some of the questions where the negative marking shall be inbuilt in the form of different marks being awarded to the most appropriate and not so appropriate answer for such questions.

(i) There shall be four alternatives for the answers to every question. For each question for which a wrong answer has been given by the candidate, one-third (0.33) of the marks assigned to that question shall be deducted as penalty.

(ii) If a candidate gives more than one answer, it shall be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above for that question.

(iii) If a question is left blank i.e. no answer is given by the candidate, there shall be no penalty for that question.

8. Main Examination (Written and Interview)

1. The Main Examination shall consist of written test and an interview test. The written examination shall consist of nine papers of conventional essay type in the subjects set out in Section 2 of SCHEDULE-III in which there shall be two papers in part-I which are qualifying in nature and seven papers in part-II for assessment of merit of the candidate. Detail syllabus for papers in part-II shall be set out by the Commission. Marks obtained for all the compulsory papers (Paper-I to Paper-VII in part-II) and Marks obtained in Interview for Personality Test shall be counted for ranking.

2. Candidates who obtain such minimum qualifying marks in the part-II of the written part of the Main Examination as may be fixed by the Commission at their discretion, shall be called by them for an interview for a Personality Test, as provided in section-I of SCHEDULE-III. After Main Examination, the number of candidates to be called for interview shall be about twice of the number of vacancies to be filled. The interview shall carry 250 marks (with no minimum qualifying marks).

3. Marks thus obtained by the candidates in the Main Examination (written as well as interview) shall determine their final ranking. Candidates shall be allotted to the various Services keeping in view their merit in the examination and the preferences expressed by them for the various Services and posts.

SCHEDULE-III

[*See rule 4 (5) and rule 12*]

SCHEME AND SUBJECTS FOR THE PRELIMINARY AND MAIN EXAMINATION

1. Preliminary Examination :

(i) The Examination shall comprise of two compulsory Papers of 200 marks each and each paper shall be of two hours duration.

(ii) Both the question papers shall be of the objective type (multiple choice questions).

(iii) The General Studies paper-I of the Civil Services (Preliminary) Examination will be a qualifying paper with minimum qualifying marks fixed at 33%.

(iv) The question papers other than language and Literature shall be set in English. Candidates must answer the papers in their own handwriting and the facility of Scribe or Reader as the case may be, may be allowed by the Commission to the candidates with disability having physical requirement and functional classification as may be prescribed by the Government from time to time. However, compensatory time of twenty minutes per hour wherever applicable shall be permitted to such candidates by the Commission.

Detailed Syllabus for the Preliminary Examination

Paper I

(i) Current events of national and international importance.
(ii) History of India and Indian Nationalism.
(iii) History of Odisha and Odia Nationalism.
(iv) Odisha and Indian Geography-Physical, Social, Economic Geography of India and the World.
(v) Indian Polity and Governance-Constitution, Political System, Panchayati Raj, etc.
(vi) Public Policy, Rights Issues, etc.
(vii) Economic and Social Development-Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, etc.
(viii) General issues on Environmental ecology, Bio-diversity and Climate Change – that do not require subject specialization.
(ix) General Science.

Paper II

(i) Comprehension;
(ii) Interpersonal skills including communication skills;
(iii) Logical reasoning and analytical ability;
(iv) Decision making and problem solving;
(v) General mental ability;
(vi) Basic numeracy (numbers and their relations, orders of magnitude, etc.) (Class X level), Data interpretation (charts, graphs, tables, data sufficiency etc. – Class X level)

Note- It is mandatory for the candidate to appear in both the Papers of Preliminary Examination for the purpose of evaluation. Therefore a candidate shall be disqualified in case he or she does not appear in both the papers of Preliminary Examination.

2. Main Examination :

(1) The written examination shall comprise of two parts, i.e., Part-I and Part-II consisting of the following papers :-

Part-I QUALIFYING PAPERS :	**Marks**
Paper-I : Odia Language The pattern of questions shall be broadly as follows: (i) Comprehension of given passages. (ii) Précis writing. (iii) Usage and vocabulary. (iv) Short Essays. (v) Translation from English to the Odia Language and vice-versa.	250
Paper-II : English Language The pattern of questions shall be broadly as follows: (i) Comprehension of given passages. (ii) Précis writing. (iii) Usage and vocabulary. (iv) Short Essays.	250

Part-II: PAPERS TO BE COUNTED FOR MERIT	Marks
Paper-I : Essay	250
Paper-II : **General Studies-I** (Indian Heritage and Culture, Oddia Heritage and Culture, History and Geography of the World and Society)	250
Paper-III : **General Studies-II** (Governance, Constitution, Polity, Social Justice and Inter-State Relations)	250
Paper-IV : **General Studies-III** (Technology, Economic Development, Bio-diversity, Environment, Security and Disaster Management)	250
Paper-V: **General Studies-IV** (Ethics, Integrity and Aptitude)	250
Paper-VI : **Optional Subject – Paper-I**	250
Paper-VII : Optional Subject – Paper-II	250
SUB-TOTAL (WRITTEN TEST)	1750 Marks
Personality Test	250 Marks
GRAND TOTAL	2000 Marks

(2) Candidates may choose any one of the subjects from amongst the list of subjects given below for optional Paper-VI and Paper-VII of the written test:–

List of optional subjects for Main Examination	
(i) Agriculture	(xix) Mechanical Engineering
(ii) Agriculture Engineering	(xx) Medical Science
(iii) Animal Husbandry and Veterinary Science	(xxi) Philosophy
(iv) Anthropology	(xxii) Physics
(v) Botany	(xxiii) Political Science and International Relations
(vi) Chemistry	(xxiv) Psychology
(vii) Civil Engineering	(xxv) Public Administration
(viii) Commerce and Accountancy	(xxvi) Sociology
(ix) Economics	(xxvii) Statistics
(x) Education	(xxviii) Zoology
(xi) Electrical Engineering	(xxix) Literature of any one of the following languages: English, Hindi,
(xii) Fishery Science	
(xiii) Forestry	

(xiv) Geography (xv) Geology (xvi) History (xvii) Home Science (xviii)Law (xix) Management (xx) Mathematics	Odia, Persian, Sanskrit, and Urdu.

NOTE :

(a) The papers on Odia Language and English (Part-I of Main examination) shall be of Matriculation or equivalent standard and shall be of qualifying nature. The marks obtained in these papers will not be reckoned for ranking.

(b) The aim of the papers on Odia Language and English (Part-I of Main examination) is to test the candidates' ability to read and understand discursive prose, and to express his ideas clearly and correctly, in Odia and English Language.

(c) Evaluation of the papers, namely, 'Essay', 'General Studies' and Optional Subject of all the candidates shall be done simultaneously along with evaluation of their qualifying papers on 'Odia' and 'English' language in Part-I, but the papers on Essay, General Studies and Optional Subject of only such candidates shall be taken cognizance who obtain 25% marks in 'Odia' and English language each in part-I as minimum qualifying standards in those qualifying papers.

(d) Marks obtained by the candidates for the Paper I-VII in Part-II only shall be reckoned for merit ranking. However, the Commission may have the discretion to fix qualifying marks in any or all of these papers.

(e) The question papers for the examination shall be of conventional (essay) type.

(f) Each paper shall be of three hours duration.

(g) The question papers (other than Indian Language and Literature) shall be set in English.

(3) General instructions (Preliminary as well as Main examination):

(i) Candidates must answer the papers in their own handwriting and the facility of Scribe or Reader as the case may be, may be allowed by the Commission to the candidates with disability having physical impairment and functional classification as may be prescribed by the Government from time to time. Besides, compensatory time of

twenty minutes per hour wherever applicable shall be permitted to such candidates by the Commission.

(ii) The Commission shall be competent to fix the qualifying marks in any or all the subjects of the examination.

(iii) If a candidate's handwriting is not easily legible, a deduction will be made on this account from the total marks otherwise accruing to him.

(iv) Marks will not be allotted for mere superficial knowledge.

(v) Credit will be given for orderly, effective and exact expression combined with due economy of words in all subjects of the examination.

(vi) In the question papers, wherever necessary questions involving the Metric system of weights and measures only will be set.

(vii) Candidates shall use only International form of Indian numerals i.e. 1,2,3,4,5,6, etc. while answering question papers.

(viii) Candidates will be allowed the use of scientific (Non-programmable type) calculators at the conventional (Entry) type examination of OPSC. Programmable type calculators will, however, not be allowed and the use of such calculators shall tantamount to resorting to unfair means by the candidates. Loaning or interchanging of calculators in the Examination Hall is not permitted.

(ix) Candidates are not permitted to use calculators for answering objective type papers (Test Booklets). They should not, therefore, bring the same inside the Examination Hall.

3. Personality Test/ Interview

The candidate shall be interviewed by a Board to be constituted by the OPSC who will have before them a record of his career. He shall be asked questions on matters of general interest. The object of the interview is to assess the personal suitability of the candidate for a career in public service. The test is intended to judge the mental calibre of a candidate, his intellectual qualities as well as social traits and his interest in current affairs. Further some of the qualities like mental alertness, critical powers of assimilation, clear and logical exposition, balance of judgment, variety and depth of interest, ability for social contacts and leadership, intellectual and moral integrity are to be judged by the said Board.

The interview test is not intended to be a test either of the specialised or general knowledge of the candidates which has been already tested through the written papers. The candidate is expected to have taken an intelligent interest not only in their special subjects of academic study but also in the events which are happening around them both within and outside his/her State or Country as well as in modern currents of thought and in new discoveries which should rouse the curiosity of well-educated youth."

By Order of the Governor
SURENDRA KUMAR
Principal Secretary to Government

Printed and Published by the Director, Printing, Stationery and Publications, Odisha, Cuttack-10
OGP/599P Ex Gaz 2131-183+200

ANNEXURE -IV

Government of Odisha
Home Department

Notification

No.[illegible]/Bhubaneswar, dated the 4.7.2011.

In exercise of the powers conferred by Rule 21 of the Odisha Police Service, Group-A (Junior Branch) Recruitment Rule 2010, the Governor of Odisha has been pleased to prescribe regulations as in Annexure-I to regulate the Physical examination of candidates for direct recruitment to Odisha Police Service, Group-A, Junior Branch.

By order of the Governor
U.N. Behera
Principal Secretary to Government.

Memo No. 29433/ Bhubaneswar, dated the 4.7.2011.

Copy along with copy of the Notification forwarded to the Director of Printing, Stationery and Publications, Odisha, Madhupatna, Cuttack for favour of publication in extraordinary Odisha Gazette.

He is requested to supply 300 (Three Hundred) copies copies to this Department at an early date.

Sd/-4.7.2011
Additional Secretary to Government.

Memo No. 29434/Bhubaneswar, dated the 4.7.2011.

Copy along with copy of the Notification forwarded to the D.G. & I.G. of Police, Odisha. Chairman-cum-Secretary, OPSC, Cuttack for information and necessary action.

Sd/-4.7.2011
Additional Secretary to Government.

Memo No. 29435/ Bhubaneswar, dated the 4.7.2011.

Copy along with copy of the Notification forwarded to all Departments of Government for information and necessary action.

Sd/-4.7.2011
Additional Secretary to Government.

REGULATIONS RELATING TO THE PHYSICAL CHARACTERISTICS OF CANDIDATES APPLYING FOR THE ODISHA POLICE SERVICE

These regulations are published for the convenience of candidates and enable them to ascertain the probability of their possessing the required physical standard. The regulations are also intended to provide guidelines to the medical examiners.

The Government of Odisha reserve to themselves absolute discretion to reject or accept any candidate after considering the report of the Medical Board.

PHYSICAL STANDARDS

1. To be passed as fit for appointment, a candidate must be in good mental and bodily health and free from any physical defect likely to interfere with the efficient performance of the duties on his appointment.

2. (a) In the matter of correlation of age, height and chest girth of candidates of India, it is left to the Medical Board to use whatever correlation figures are considered most suitable as a guide in the examination of the candidates. If there be any disproportion with regard to height, weight and chest girth, the candidates should be hospitalised for investigation and X-ray of the chest taken before the candidate is declared fit or not fit by the Board.

(b) For the Odisha Police Service minimum standard for height and chest girth without which candidate cannot be accepted, are as follows:

		Height	Chest Girth fully expanded	[illegible]
	1	2	4	5
1	Men (ST/SC/SEBC) (SC)	165 cm	84 cm	5 cm
2	Men (UR)	168 cm	84	5 cm
3	Women (ST/SC/SEBC) (SC)	150 cm	79 cm	5 cm
4	Women (UR)	155 cm	79 cm	[illegible]

3. The candidate's height will be measured as follows:

He will remove his shoes and be placed against the standard with his feet together and the weight thrown on the heels and not on the toes or other sides of the feet. He will stand erect without rigidity and with heels, calves, buttocks and shoulders touching the standard; the chin will be depressed to bring the vertex of the head level under the horizontal bar and the height will be recorded in centimetres and parts of a centimetre to halves.

4. The candidate's chest will be measured as follows:

He will be made to stand erect with his feet together and to raise his arms over his head. The tape will be so adjusted round the chest that its upper edge touches the inferior angles of the shoulder blades behind and lies in the same horizontal plane when the tape is taken round the chest. The arms will then be lowered to hang loosely by the side and care will be taken that the shoulders are not thrown upwards or backwards so as to displace the tape. The candidate will then be directed to take a deep inspiration several times and the maximum expansion of the chest will be carefully noted and the minimum and maximum will then be recorded in centimetres, 84-89, 86-93.5 etc. In recording the measurements fractions of less than half a centimetre should not be noted.

N.B.- The height and chest of the candidates should be measured twice before coming to a final decision.

5. The candidate will also be weighed and his weight recorded in kilograms. Fractions of half a kilogram should not be noted.

6. (a) The candidate's **eye sight** will be tested in accordance with the following rules. The result of each test will be recorded:

(i) **General** – The candidate's eyes will be submitted to a general examination directed to the detection of any disease or abnormality. The candidate will be rejected if he suffers from any morbid conditions of eye, eyelids or contiguous structure of such a sort as to render or are likely at a future date to render him unfit for service.

(ii) Visual Acuity – The examination for determining the acuteness of vision includes two tests – one for distant, the other for near vision. Each eye will be examined separately.

(b) There shall be no limit for minimum naked eye vision but the naked eye vision of the candidate shall however be recorded by the Medical Board or other medical authority in every case, as it will furnish the basic information in regard to the condition of the eye.

(c) The following standards are prescribed for distant and near vision with or without glasses.

(d) (i) The total amount of Myopia (including the cylinder) shall not exceed minus 4.00D. Total amount of Hypermetropia (including the cylinder) shall not exceed plus 4.00D.

(ii) In every case of myopia fundus examination should be carried out and the results recorded. In the event of pathological condition being present which is likely to be progressive and affect the efficiency of the candidate, he/she should be declared unfit.

(e) **Field of vision** : The field of vision shall be tested by the confrontation method. When such test gives unsatisfactory or doubtful result the field of vision should be determined on the perimeter.

		Better eye (Corrected vision)	**Worse eye**
1	Distant Vision	6/6 or 6/9	6/12 or 6/9
2	Near Vision	J1	J2
3	Types of corrections permitted	Spectacles	
4	Limits of refractive error permitted	-4.00D (including cylinder) for Myopia +4.00D (including cylinder) Hypermetropia	
5	Colour vision requirements	High Grade	
6	Binocular vision needed	Yes	

(f) **Night Blindness**: Broadly there are two types of night blindness (1) as a result of Vitamin A deficiency and (2) as a result of Organic disease of Retina, common cause being Retinitis Pigmentosa. In (1) the fundus is normal, generally seen in younger age group and ill nourished persons and improves by large doses of vitamin A. In (2) the fundus is often involved and mere fundus examination will reveal the condition in majority of cases. The patient in this category is an adult and may not suffer from malnutrition. Persons seeking employment for higher posts in the Government will fall in this category. For both (1) and (2) dark adaptation test will reveal the condition. For (2) specially when fundus is not involved Electro-Retinography is required to be done. Both these tests (dark adaptation and retinography) are time consuming and require specialised set up and equipments and thus not possible as a routine test in a medical check up. Because of these technical considerations it is for the Ministry/Department to indicate if these tests for night blindness are required to be done. This will depend upon the job requirement and nature of duties to be performed by the prospective Government employee.

(g) **Colour Vision**: The testing of colour vision shall be essential. Colour perception should be graded into higher grade depending upon the size of aperture in the lantern as described in the table below:

	Grade	High Grade Colour Perception
1	2	3
1.	**Distance between the lamp and candidate**	16ft
2	**Size of aperture**	13 mm.
3	**Time of exposure**	5 seconds

Satisfactory colour vision constitutes recognition with ease and without hesitation of signal red, green and yellow colour. The use of Ishihara's plates, shown in good light and a suitable lantern like Edridge Green's shall be considered quite dependable for testing colour vision. While either of the two tests may ordinarily be considered sufficient in respect of services concerned with road, rail and air traffic, it is essential to carry out the lantern test. In doubtful cases where a candidate fails to qualify when tested by only one of the two tests, both the tests should be employed.

(h) **Ocular conditions other than visual acuity**:

(i) Any organic disease or a progressive refractive error, which is likely to result in lowering visual acuity, should be considered as disqualification.

(ii) **Squint**: The presence of binocular vision is essential. Squint, even if the visual acuity in each eye is of the prescribed standard, should be considered a disqualification.

(iii) If a person has one eye or if he has one eye which has normal vision and the other eye is amblyopic or has subnormal vision the usual effect is that the person **is lacking stereoscopic vision for perception of depth. Such vision is not necessary**

(iii) **Contact Lenses:** During the medical examination of a candidate, the use of contact lenses is not to be allowed. It is necessary that when conducting eye test the illumination of the typed letters for distant vision should have an illumination of 15 foot-candles.

GUIDELINES FOR SPECIAL OPHTHALMIC BOARD:

Special Ophthalmic Board for eye examination shall consist of 3 Ophthalmologists.

(a) Cases where the Medical Board has recorded visual function within normal prescribed limits but suspects a disease of progressive and organic nature, which is likely to cause damage to the visual function should refer the candidate to a Special Ophthalmic Board for opinion as part of the Main Medical Board.

(b) All cases of any type of surgery on eyes, IOL, refractive corneal surgery, doubtful cases of colour defect should be referred to special Ophthalmic Board.

(c) In such cases where a candidate is found to be having high myopia or high hypermetropia, the Main Medical Board should immediately refer the candidate for a special Board of three Ophthalmologists constituted by the Medical Superintendent of the hospital/S.M.O. with the head of the Department of Ophthalmology of the Hospital or the senior most ophthalmologist as the Chairman of the special Board. The Ophthalmologist/Medical Officer who has conducted the preliminary ophthalmic examination should not be a part of the Special Board.

The Examination by the Special Board should preferably be done on the same day. Whenever it is not possible to convene the Special Board of three Ophthalmologists on the day of the medical examination by the Main Medical Board, the Special Board may be convened at an earliest possible date.

The Special Ophthalmic Board may carry out detailed investigations before arriving at their decision.

The Medical Board's report may not be declared as complete unless it includes the report of the Special Board for all such cases which are referred to it.

GUIDELINE FOR REPORTING OF BORDER LINE ENTRY CASES:

In border line cases of substandard visual acuity, colour/unaided vision, the test will be repeated after 15 minutes by the board before declaring a person unfit.

7. **Blood pressure:**

The Board will use its discretion regarding Blood Pressure. A rough method of calculating normal maximum systolic pressure is as follows:

(i) With Young subjects 15-25 years of age the average is about 100 plus the age.

(ii) With subjects over 25 years of age the general rule of 110 plus half the age seems quite satisfactory.

N.B.- As a general rule any systolic pressure over 140 mm and diastolic over 90 mm, should be regarded as suspicious and the candidate should be hospitalised by the Board before giving their final opinion regarding the candidate's fitness or otherwise. The hospitalisation report should indicate whether the rise in blood pressure is of a transient nature due to excitement etc. or whether it is due to any organic disease. In all such cases X-ray and electrocardiographic examination of heart and blood urea clearance test should also be done as a routine. The final decision as to fitness or otherwise of a candidate will, however, rest with the medical board only.

Method of taking Blood Pressure

The mercury manometer type of instrument should be used as a rule. The measurement should not be taken within fifteen minutes of any exercise or excitement. Provided the patient and particularly his arm is relaxed he may be either lying or sitting. The arm is supported comfortably at the patient's side in a more or less horizontal position. The arm should be freed from clothes to the shoulder. The cuff completely deflated should be applied with the middle of the rubber over the inner side of the arm, and its lower edge an inch or two above the bend of the elbow. The following turns of cloth bandage should spread evenly over the bag to avoid bulging during inflation.

The brachial artery is located by palpation at the bend of the elbow and the stethoscope is then applied lightly and centrally over it below, but not in contact with the cuff. The cuff is inflated to about 200 mm. Hg. and then slowly deflated. The level at which the column stands when soft successive sounds are heard represents the Systolic Pressure. When more air is allowed to escape the sound will be heard to increase in intensity. The level at which the well, heard clear sound change to soft muffled fading sounds represents the diastolic pressure. The measurements should be taken in a fairly brief period of time as prolonged pressure of the cuff is irritating to the patient and will vitiate the reading. Rechecking, if necessary, should be done only a few minutes after complete deflation of the cuff. Sometimes as the cuff is deflated sounds are heard at a certain level; they may disappear as pressure falls and reappear at a still lower level. This 'Silent Gap' may cause error in readings.

8. The urine passed in the presence of the examiner should be examined and the results recorded. When a Medical Board finds sugar present in a candidate's urine by the usual chemical tests the Board will proceed with the examination with all its other aspects and will also specially note any signs or symptoms suggestive of diabetes. If except for the glycosuria the Board finds the candidate conforms to the standard of medical fitness required they may pass the candidate 'fit, subject to the glycosuria being non-diabetic' and the Board will refer the case to a specified specialist in Medicine who has hospital and laboratory facilities at his disposal. The Medical Specialist will carry out whatever examinations clinical and laboratory, he considers necessary including a standard blood sugar tolerance test, and will submit his opinion to the Medical Board upon which the Medical Board will base its final opinion "fit" or "unfit". The candidate will not be required to appear in person before the Board on the second occasion. To exclude the effect of medication it may be necessary to retain a candidate for several days in hospital under strict supervision.

9. A woman candidate who as a result of tests is found to be pregnant of 12 weeks standing or over should be declared temporarily unfit until the confinement is over. She should be re-examined for fitness certificate six weeks after the date of confinement, subject to the production of a medical certificate of fitness from a registered medical practitioner.

10. The following additional points should be observed:-

(a) that the candidate's **hearing in each ear is good and that there is no sign of disease of the ear.** In case it is defective the candidate should be got examined by the ear specialist; provided that if the defect in hearing is remediable by operation or by use of a hearing aid a candidate cannot be declared unfit on that account provided he/she has no progressive disease in the ear. The following are the guidelines for the medical examining authority in this regard:

1.	Perceptive deafness in both ears in which some improvement is possible by a hearing aid	Fit if the deafness is up to 30 decibel in speech frequencies of 1000-4000.
2.	Perforation of tympanic membrane of central or marginal type.	(i) One ear normal other ear perforation of tympanic membrane present: temporarily unfit. Under improved conditions of Ear Surgery a candidate with marginal or other perforation in both ears should be given a chance by declaring him temporarily unfit and then he may be considered under 4(ii) below. (ii) Marginal or attic perforation in both ears - unfit. (iii) Central perforation both ears - Temporarily unfit.
3.	Ears with mastoid cavity subnormal hearing on one side/on both sides.	(i) Either ear normal hearing other ear mastoid cavity - Fit. (ii) Mastoid cavity of both sides - Unfit.
4.	Persistently discharging ear operated/unoperated.	Temporarily Unfit.
5.	Chronic inflammatory/allergic condition of nose with or without bony deformities of nasal septum.	(i) A decision will be taken as per circumstances of individual cases. (ii) If deviated nasal Septum is present with symptoms - Temporarily unfit.
6.	Chronic inflammatory conditions of tonsils and/or Larynx.	(i) Chronic inflammatory conditions of tonsils and/or Larynx - Fit. (ii) Hoarseness of voice of severe degree if present then Temporarily unfit.
7.	Benign or locally malignant tumours of the E.N.T.	(i) Benign tumours - Temporarily unfit. (ii) Malignant Tumour - Unfit.
8.	Otosclerosis	If the hearing is within 30 decibels after operation: Fit. With the help of hearing aid Fit.
9.	Congenital defects of ear, nose or throat.	(i) If not interfering with functions - Fit. (ii) Stuttering of severe degree - Unfit.
10.	Nasal Poly.	Temporarily Unfit.

(b) That his speech is without impediment;
(c) That his teeth are in good order and that he is provided with dentures where necessary for effective mastication (well filled teeth will be considered as sound);
(d) That the chest is well formed and his chest expansion sufficient; and that his heart and lungs are sound;
(e) That there is no evidence of any abdominal disease;
(f) That he is not ruptured;
(g) That he does not suffer from hydrocele, varicose veins or piles;
(h) That his limbs, hands and feet are well formed and developed and that there is free and perfect motion of all joints;
(i) That he does not suffer from any inveterate skin disease;
(j) That there is no congenital malformation or defect;
(k) That he does not bear traces of acute or chronic disease pointing to an impaired constitution;
(l) That he bears marks of efficient vaccination; and
(m) That he is free from communicable disease.

11. Radiographic examination of the chest of candidate for detecting any abnormality of the heart and lungs which may not be apparent by ordinary physical examination will be done at the time when he is called for the Personality Test by the Odisha Public Service Commission.

The decision of the Chairman of the State Standing Medical Board conducting the medical examination of the concerned candidates about the fitness of the candidate shall be final.

In case of doubt regarding health of a candidate the Chairman of the Medical Board may consult a suitable Hospital specialist to decide the issue of fitness or unfitness of the candidate for Government Service e.g. if a candidate is suspected to be suffering from any mental defect or aberration the Chairman of the Board may consult a Hospital Psychiatrist/Psychologist etc.

When any defect is found it must be noted in the certificate and the medical examiner should state his opinion whether or not it is likely to interfere with the efficient performance of the duties which will be required of the candidate.

12. The candidates filing an appeal against the decision of the Medical Board have to deposit an appeal fee of Rs.100.00 in such manner as may be prescribed by the Government of India in this behalf. This fee would be refunded if the candidate is declared fit by the Appellate Medical Board. The candidates may, if they like enclose medical certificate in support of their claim of being fit. Appeals should be submitted within 21 days of the date of the communication in which the decision of the Medical Board is communicated to the candidates otherwise request for second medical examination by an Appellate Medical Board will not be entertained. The Medical Examination by the Appellate Medical Board would be arranged at Cuttack only and no travelling allowance or daily allowance will be admissible for the journeys performed in connection with the medical examination. Necessary action to arrange medical examination by Appellate Medical Boards would be taken by the General Administration Department on receipt of appeal accompanied by the prescribed fee.

MEDICAL BOARD'S REPORT

The following intimation is made for the guidance of the Medical Examiner:

1. The standard of physical fitness to be adopted should make due allowance for the age and length of service, if any, of the candidate concerned.

No person will be deemed qualified for admission to the public service who shall not satisfy Government or appointing authority as the case may be that he has no disease, constitutional affliction, or bodily infirmity, unfitting him or likely to unfit him for that Service.

It should be understood that the question of fitness involves the future as well as present and that one of the main objects of medical examination is to secure continuous effective service and in the case of candidates for permanent appointment to prevent early pension or payments in case of premature death. It is at the same time to be noted that the question is one of the likelihood of continuous effective service and that rejection of a candidate need not be advised on account of the presence of a defect which in only a small proportion of cases is found to interfere with continuous effective service.

A Lady Doctor will be co-opted as a member of the Medical Board whenever a woman candidate is to be examined.

The report of the Medical Board should be treated as confidential.

In case where a candidate is declared unfit for appointment in the Government Service the ground for rejection may be communicated to the candidate in broad terms without giving minute details regarding the defects pointed out by the Medical Board.

In case where a Medical Board considers that minor disability disqualifying a candidate for Government Service can be cured by treatment (medical or surgical) a statement to this effect should be recorded by the Medical Board. There is no objection to a candidate being informed of the Board's opinion to this effect by the appointing authority and when a cure has been effected it will be open to the authority concerned to ask for another Medical Board.

In the case of candidates who are to be declared "Temporarily Unfit" the period specified for re-examination should not ordinarily exceed six months at the maximum. On re-examination after the specified period these candidates should not be declared temporarily unfit for a further period but a final decision in regard to their fitness for appointment or otherwise should be given.

(a) Candidate's statement and declaration

The candidate must make the statement required below prior to his Medical Examination and must sign the Declaration appended thereto. His attention is specially directed to the warning contained in the Note below.

1.	State your name in full (in block letters)	
2.	State your age and birth place	
3.	(a) Have you ever had smallpox, intermittent or any other fever, enlargement or suppuration of glands, spitting of blood, asthma, heart disease, lung disease, fainting attacks, rheumatism, appendicitis? Or (b) Any other disease or accident requiring confinement to bed and medical or surgical treatment?	
4.	When were you last vaccinated?	
5.	Have you suffered from any form of nervousness due to over work or any other cause?	
6.	Furnish the following particulars concerning your family:	

	Father's age if living and state of health	Father's age at death and cause of death	No. of brothers living, their age and state of health	No. of brothers dead, their age and cause of death
	1	2	3	4
(i)				
(ii)				
(iii)				

	Mother's age if living and state of health	Mother's age at death and cause of death	No. of sisters living, their age and state of health	No. of sisters dead, their age and cause of death
	1	2	3	4
(i)				
(ii)				
(iii)				

7.	Have you been examined by a Medical Board before?	
8.	If answer to the above is "Yes", please state what Service/Services you were examined for?	
9.	Who was the examining authority?	

11.	When and where was the Medical Board held?	
12.	Result of the Medical Board's examination, if communicated to you or if known.	
13.	All the above statements are to the best of my knowledge and belief, true and correct and I shall be liable for action under law for any material untruth or the information furnished by me or suppression of relevant material information. The furnishing of false information or suppression of any factual information would be a disqualification and is likely to render me unfit for employment under the government. If the fact that false information was been furnished or that there was been suppression of any factual information comes to notice at any time during my services, my services would be liable to be terminated.	

Candidate's signature

Signed in my presence

Signature of the Chairman of the Board

[illegible]

(b) Report of the Medical Board on (name of candidate) Physical examination:

1. General development: Good .... Fair ....
Poor .... Nutrition: Thin .... Average ....
Obese .... Height (without shoes) .... Weight ....
Best Weight .... When .... Any recent changes in weight .... Temperature ....

Girth of Chest:

(1) After full inspiration:
(2) After full expiration:

2. Skin: Any obvious disease:
3. Eyes:

(i) Any disease ....
(ii) Night blindness ....
(iii) Defect in colour vision ....
(iv) Field of vision ....
(v) Visual acuity ....
(vi) Fundus examination ....

Acuity of vision	Naked eye with glasses	Strength of glass Sph. Cyl. Axis
1	2	3
Distant vision	RE LE	
Near vision	RE LE	
Hypermetropia (Manifest)	RE LE	

4. Ears: Inspection .... Hearing:
Right Ear ....
Left Ear ....
5. Glands .... Thyroid ....
6. Condition of teeth ....
7. Respiratory system: Does physical examination reveal anything abnormal in the respiratory organs ....
If yes, explain fully ....
8. Circulatory System:
(a) Heart: Any Organic Lesions .... Rate standing ....
After hopping 25 times .... 2 minutes after hopping ....
(b) Blood Pressure:
Systolic .... Diastolic ....
9. Abdomen:
Girth .... Tenderness ....
Hernia ....
(a) Palpable: Liver .... Spleen ....
Kidneys .... Tumours ....
Haemorrhoids .... Fistula ....
10. Nervous System: Indications of nervous or mental disabilities ....

11. Loco-Motor System : Any abnormality ____________

12. Genito Urinary System : Any evidence of Hydrocele, Varicocele etc.

Urine Analysis :

(a) Physical appearance ____________
(b) Sp. Gr. ____________
(c) Albumen ____________
(d) Sugar ____________
(e) Casts ____________
(f) Cells ____________

13. Is there anything in the health of the candidate likely to render him unfit for the efficient discharge of his duties in the service for which he is a candidate?

Note : In the case of female candidates, if it is found that she is pregnant of 12 weeks standing or over, she should be declared temporarily unfit vide Regulation 9.

14. (i) State the service for which the candidate has been examined.
(ii) Has he/she been found qualified in all respects, for the efficient and continuous discharges of his/her duties in Odisha Police Service.
(iii) Is the candidate fit for FIELD SERVICE?

15. Chest X-Ray Examination.

Note : The Board should record their findings under one of the following three categories :

(i) Fit ____________
(ii) Unfit on account of ____________
(iii) Temporarily unfit on account of ____________

Place   Signature   Chairman

Member

Member

Date

Seal of the Medical Board

ANNEXURE- I

Paper-I

Essay

Candidates may be required to write essays on multiple topics. They are to examine to what extent is the subject of the essay to arrange their ideas in orderly fashion, and to write concisely. Credit will be given for effective and lucid expression.

Syllabi for General Studies-I to IV of
Odisha Civil Services
(Main Written Examination)

PAPER-II

General Studies-I: Indian Heritage and Culture, Odisha Heritage & Culture, History and Geography of the World & Society

Heritage and Culture

- Indian culture covering the salient aspects of Art Forms, Literature and Architecture from Ancient to Modern times.
- Temple Architecture of Odisha
- Socio-religious movement in Odisha
- Bhakti Movement in Odisha and its impact on the Society of Odisha.
- Evolution and Growth of Odia language and Literature and development of Odia Literature
- Regional Tradition of Odisha Festivals

History

- Modern Indian history from about the middle of the eighteenth century until the present – significant events, personalities, issues.
- The Freedom Struggle – its various stages and important contributors/contributions from different parts of the country.
- Post-independence consolidation and reorganization within the country.
- Kalinga war and its significance
- Ancient History of Odisha: Mahameghavahana the Chedis, The Bhauma Karas and The Somavamsis, The Gangas and Gajapatis
- Early Resistance Movements in Odisha: Paik Rebellion, the Sambalpur Revolt and the Revolt of 1857.
- Creation of Odisha Province.
- Freedom Movement and the Praja Mandal Movement in Odisha, the Evolution of Odia Nationalism, Integration of Princely States in Odisha, Social reform movements in Odisha.

Geography of India with special reference to Odisha

- Physical, economic and social geography of India.
- Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone, geographical features and their location-changes in critical geographical features (including waterbodies and ice-caps) and in flora and fauna and the effects of such changes.
- Odisha's natural resources: water, forests & minerals
- Odisha's Physiography and Riverine system
- Salient features of Indian Society, Diversity of India and Odisha.

- Role of women and women's organization, population and associated issues, poverty and developmental issues, urbanization, their problems and remedies.
- Effects of globalization on Indian society vis-a-vis Odisha.
- Distribution and growth of cities and urban population in Odisha – Urbanization – Growth of urban population and urban centres in Odisha.
- Social empowerment, communalism, regionalism & secularism.

PAPER-II

General Studies-II: Governance, Constitution, Polity, Social Justice and International Relations

Governance, Constitution, Polity and Inter-State Relations

- Indian Constitution — historical underpinnings, evolution, features, amendments, significant provisions and basic structure.
- Functions and responsibilities of the Union and the States, issues and challenges pertaining to the federal structure, devolution of powers and finances up to local levels and challenges therein.
- Separation of powers between various organs dispute redressal mechanisms and institutions.
- Comparison of the Indian constitutional scheme with that of other countries.
- Parliament and State legislatures — structure, functioning, conduct of business, powers & privileges and issues arising out of these.
- Structure, organization and functioning of the Executive and the Judiciary — Ministries and Departments of the Government; pressure groups and formal/informal associations and their role in the Polity.
- Salient features of the Representation of People's Act, Odisha Right to Public Services Act and Odisha Lokayukta Act.
- Appointment to various Constitutional posts, powers, functions and responsibilities of various Constitutional Bodies.
- Statutory, regulatory and various quasi-judicial bodies.
- Important aspects of governance, transparency and accountability, e-governance- applications, models, successes, limitations, and potential; citizens charters, transparency & accountability and institutional and other measures.
- Role of Civil Services and State Civil services in a democracy.
- Panchayati Raj Institutions (PRIs) in Odisha.
- Odisha and its Neighbouring States – relations

Social Justice

- Government policies and interventions for development in various sectors and issues arising out of their design and implementation – India and Odisha.
- Development processes and the development industry – the role of NGOs & women SHGs.
- Welfare schemes for vulnerable sections of the population by the Centre and the performance of these schemes; mechanisms, laws, institutions and Bodies constituted for the protection and betterment of these vulnerable sections – India and Odisha.
- Issues relating to development and management of Social Sector/Services relating to Health, Education, Human Resources – India and Odisha.
- Issues relating to poverty and hunger – Sustainable Development Goals.

PAPER-IV

General Studies III: Technology, Economic Development, Bio-diversity, Environment, Security and Disaster Management

Science & Technology

- Science and Technology-developments and their applications and effects in everyday life.
- Achievements of Indians in science & technology; indigenization of technology and developing new technology.
- Awareness in the fields of IT, Space, Computers, Robotics, Nano-technology, Bio-technology and issues relating to intellectual property rights.

Economic Development

- Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.
- Inclusive growth and issues arising from it.
- Government Budgeting – India and Odisha.
- Land reforms in India & Odisha.
- Effects of liberalization on the economy, changes in industrial policy and their effects on industrial growth.
- Infrastructure: Energy, Ports, Roads, Airports, Railways etc. in the Country and Odisha.
- Mineral resources of Odisha – issues and prospects.

Agriculture

- Major cropping patterns in various parts of the country, different types of irrigation and irrigation systems storage, transport and marketing of agricultural produce and issues and related constraints; e-technology in the aid of farmers in India & Odisha.
- Issues related to direct and indirect farm subsidies and minimum support prices; Public Distribution System- objectives, functioning, limitations, revamping; issues of buffer stocks and food security; Technology missions; economics of animal-rearing in India & Odisha – Doubling of farmers' income.
- Food processing and related industries in India & Odisha – scope and significance, location, upstream and downstream requirements, supply chain management.

Biodiversity and Environment

- Conservation, environmental pollution and degradation, environmental impact assessment.
- Disaster and disaster management in the Country and in Odisha – [illegible] experience and [illegible] Disaster Management.
- Linkages between development and spread of extremism. Left wing extremism in Odisha.

Security and Disaster Management

- Challenges to internal security through communication networks, role of media and social networking sites in internal security challenges, basics of cyber security; money-laundering and its prevention – Acts & policies relating to Cyber Security and Money Laundering.
- Security challenges and their management in border areas – linkages of organized crime with terrorism.
- Various Security forces and agencies of the Country and Odisha and their mandate.

PAPER-IV

General Studies-IV: Ethics, Integrity and Aptitude

This paper will include questions to test the candidates' attitude and approach to issues relating to integrity, probity in public life and his problem solving approach to various issues and conflicts faced by him in dealing with society. Questions may utilise the case study approach to determine these aspects. The following broad areas will be covered:

- Ethics and Human Interface: Essence, Determinants and Consequences of Ethics in Human Actions; Dimensions of Ethics; Ethics – in Private and Public

Relationships; Human Values – Lessons from the Lives and Teachings of Great Leaders, Reformers and Administrators; Role of Family, Society and Educational Institutions in Inculcating Values.

- Attitude: Content, Structure, Function; its Influence and Relation with Thought and Behaviour; Moral and Political Attitudes; Social Influence and Persuasion.
- Aptitude and Foundational Values for Civil Service, Integrity, Impartiality and Non-partisanship, Objectivity, Dedication to Public Service, Empathy, Tolerance and Compassion towards the weaker sections.
- Emotional Intelligence-Concepts, and their Utilities and Application in Administration and Governance.
- Contributions of Moral Thinkers and Philosophers from India and World.
- Public/Civil Service Values and Ethics in Public Administration: Status and Problems; Ethical Concerns and Dilemmas in Government and Private Institutions; Laws, Rules, Regulations and Conscience as Sources of Ethical Guidance; Accountability and Ethical Governance; Strengthening of Ethical and Moral Values in Governance; Ethical Issues in International Relations and Funding; Corporate Governance.
- Probity in Governance: Concept of Public Service; Philosophical Basis of Governance and Probity; Information Sharing and Transparency in Government, Right to Information, Codes of Ethics, Codes of Conduct, Citizen's Charters, Work Culture, Quality of Service Delivery, Utilization of Public Funds, Challenges of Corruption.
- Case Studies on above issues.

Syllabi for Optional Subjects of
Odisha Civil Services
(Main Written Examination)

AGRICULTURE

PAPER – I

Section – A

Cropping pattern in different a g r o climatic zones of the country. Crop diversification. Impact of high-yielding and short-duration varieties on shifts in cropping pattern. Concepts of multiple cropping, multistorey, relay and inter-cropping, and their importance in relation to food production. Package of practices of cereals, pulses, oil seeds, fibres, sugar, tuber and fodder crops grown during Kharif and Rabi seasons in different regions of the country. Organic farming – principles and practices.

Water-use efficiency in relation to crop production, criteria for scheduling irrigation, ways and means of reducing run-off losses of irrigation water. Drip and sprinkler irrigation. Drainage of water-logged soils, quality of irrigation water, effect of industrial effluents on soil and water pollution.

Weeds, their characteristics, dissemination and association with various crops; their multiplication; cultural, biological and chemical control of weeds.

Important features, scope and propagation of various types of forestry plantations such as extension, social forestry, agro-forestry, and natural forests.

Soil-physical, chemical and biological properties. Processes and factors of soil formation. Modern classification of Indian soils. Mineral and organic constituents of soils and their role in maintaining soil productivity. Essential plant nutrients and other beneficial elements in soils and plants. Principles of soil fertility and its evaluation for judicious fertiliser use. Integrated nutrient management. Losses of nitrogen in soil, nitrogen-use efficiency in submerged rice soils, nitrogen fixation in soils. Fixation of phosphorus and potassium in soils and the scope for their efficient use. Problem soils and their management.

Soil conservation planning on watershed basis. Erosion and run-off management in hilly, foot hills, and valley lands; processes and factors affecting them. Dryland agriculture and its problems. Technology for stabilising agricultural production in rain-fed areas.

Section - B

Ecology and its relevance to man. Biodiversity - natural resources, their sustainable management and conservation. Physical and social environment as factors of crop distribution and production. Climatic elements as factors of crop growth, impact of changing environments on cropping pattern as indicators of environments. Environmental pollution and associated hazards to crops, animals and humans.

Farm management, scope, importance and characteristics, farm planning and budgeting. Economics of different types of farming systems and factors affecting it. Marketing and pricing of agricultural inputs and outputs, price fluctuation and their cost; role of co-operatives in agricultural economy. Agriculture export zone. World Trade Organization, General Agreement on Trade and Tariff, Intellectual Property Rights in relation to agriculture.

Agricultural extension, its importance and role, methods of evaluation of extension programmes, socio-economic survey and status of big, small, and marginal farmers and landless agricultural labourers; farm mechanization and its role in agricultural production and rural employment. Training programmes for extension workers; Institution-Village Linkage programmes.

PAPER - II

Section - A

Cell theory, structure, organelle and their function. Cell division, nucleic acids-structure and function, gene structure and function. Laws of heredity, their significance in plant breeding. Chromosome structure, chromosomal aberrations, linkage and cross-over, and their significance in recombination breeding. Polyploidy, euploids and aneuploids. Mutation—micro and macro mutation and their role in crop improvement. Variation, components of variation, heritability, sterility and incompatibility and their application in crop improvement. Cytoplasmic inheritance, sex-linked, sex-influenced and sex-limited characters.

History of plant breeding. Modes of reproduction, selfing and crossing techniques. Origin and evolution of crop plants, centre of origin, law of homologous series. Plant biodiversity - crop genetic resources conservation and utilization. Application of principles of plant breeding to the improvement of major field crops. Pure-line, pedigree, mass and recurrent selections. Combining ability, its significance in plant breeding. Hybrid vigour and its exploitation, backcross method of breeding, breeding for disease and pest resistance, role of interspecific and intergeneric hybridization. Role of biotechnology in plant breeding-tissue culture and molecular approach. Improved varieties, hybrids, composites of various crop plants.

Seed technology, its importance. Different kinds of seeds. Seed production and processing techniques. Role of public and private sectors in seed production, processing and marketing in India.

Plant physiology and its significance in agriculture. Imbibition, surface tension, diffusion and osmosis. Absorption and translocation of water, transpiration and water economy. Enzymes and plant pigments; photosynthesis-modern concepts and factors affecting the process, anaerobic and anaerobic respiration, C_3, C_4 and CAM mechanisms. Carbohydrate, protein and fat metabolism. Growth and development, photoperiodism and vernalization, Auxins, hormones, and other plant regulators and their modes of action and importance in agriculture. Physiology of seed development and germination, dormancy.

Section – II

Climatic requirements and cultivation of major fruits, vegetable crops and flower and ornamental plants. Orchard and Highrich horticulture. Handling and marketing problems of fruits and vegetables. Methods of preservation of important fruits and vegetable products, processing techniques and equipments. Role of fruits and vegetables in human nutrition. Land scaping – design and layout of lawns and gardens.

Diseases and pests of field crops, vegetables, orchard and plantation crops of fruits. Causes and classification of plant pests and diseases. Principles of control of plant pests and diseases. Biological control of pests and diseases. Integrated pest and disease management. Epidemiology and forecasting of diseases and pest. Pesticides, their formulations and mode of action. Compatibility with microbial inoculants. Mycotoxin toxins. Storage pests and diseases of cereals, oilseeds and pulses and their control. Commercial cultivation of mushroom and bee keeping.

Food production and consumption trends in India. National and international food policies. Production, procurement, distribution and processing constraints. Relation of food production to nutritional security contents. Protein – calorie malnutrition.

AGRICULTURAL ENGINEERING

Paper-I

Section – A

1. **Surveying :**

Chain survey, compass survey, plane table survey, computation of area, levelling, contour survey, land levelling, design, methods, earth work computation, land grading, land shaping, layout of fields, irrigation and drainage systems planning.

2. **Fluid mechanics and irrigation :**

Hydraulics of flow, open channel flow, steady and unsteady, uniform and non uniform, laminar and turbulent, Reynold's number, Froude number, critical depth, hydraulic jump, Chezy's and Manning's formula. Soil-water-plant relationship, soil moisture types and its measurement, movement of water in soil, evaporation, transpiration, evapotranspiration, water requirement of crops, field capacity, wilting point, available soil moisture, consumptive use-methods of estimation, irrigation efficiencies, irrigation scheduling, irrigation methods(gravity and pressure irrigation systems) and their adaptability, micro irrigation system, measurements of irrigation water, irrigation planning and farm water management, earthen channel, lined channel, lining materials, culverts, inverted syphons, under ground pipe irrigation, evaluations, participatory irrigation management. Irrigation pumps types and suitability, selection of pumps, installation of pumps, care and maintenance of pumps.

3. **Drainage :**

Water logging problems in crops, drainage coefficient, size of drainage in cropped area, drainage investigation and selection, open drains on farm, Field surface drainage, sub-surface drainage systems, pipe drainage, mole drains, tube-well drainage, bio drainage, saturated hydraulic conductivity, salinity control and drainage water utilization.

Section – II

4. Groundwater & surface hydrology; wells and pumps :

Hydrological cycle: measurement of rainfall, evaporation, infiltration, estimation of runoff, factors affecting runoff, computation of volume of runoff and peak flow, unit hydrograph. Occurrence of ground water and its movement, aquifer types, well screens, gravel packing, radius of influence, transmissibility, basin-wide ground water development, ground water recharge, artificial recharge, ground water investigation, well hydraulics, types of shallow and deep tube wells, their method of construction, design of tube wells and open wells, aquifer test, boring and deepening of open wells, testing of tubewells and radial collector wells, well development, stress-strain relationship.

5. Soil conservation and Watershed Management :

Soil erosion: types, factors affecting different types of erosion, methods to control soil erosion-biological control measures, contour farming, strip cropping, mixed cropping, inter cropping, mulching, mechanical control measures-their suitability for different conditions-design of contour ditches, contour bunds, graded bunds, bench terraces, contour stone wall-gully control structures-vegetative control methods-check dams, loose rock dam, drop spillway, chute spillway and drop inlet spillway, universal soil loss equation, vegetated waterways-its design.

Watershed concept, land capability classification, objectives of watershed management-selection of priority areas, management of natural resources, water harvesting, farm pond, percolation pond, runoff farming systems, catchment area treatment, agro-forestry-based soil and water conservation, integrated watershed development, role of remote sensing and GIS in watershed planning, development and evaluation.

6. Farm structures :

Building Materials, bearing capacity of soil, factor of safety, types of masonry foundations, beams and superstructures, types of roofs, building plan and estimation, planning of farmstead and farm residence, farm fencing, farm gates, farm roads, dairy farm, poultry house and equipments, silo, feed storage structures, grain storage structures, storage structure for seed production, threshing floor, drying floors, storage structure for fertilizer and seeds.

PAPER – II

Section – A

1. Farm Power and Machinery

Agricultural mechanization and its scope. Sources of farm power. History of tractor development. Thermodynamic cycles. Thermal efficiency. Classification, construction and working principles of internal combustion (IC) engines. Fuels, ignition, lubrication, cooling, governing systems of I.C. engines. Different types of tractors and Power tillers, their manufacturers in India & their specifications, power transmission, ground drive, power take off (PTO), differential and control systems. Operation and maintenance of farm machinery, farm tractor and engines. Tractive theory, mechanics of farm tractor chassis, weight transfer, tractive factors in tractor design. Different methods of locating C.G. of tractor. Primary and secondary tillage equipments, Sowing planting, inter culture, trenching, dibbling, harvesting and threshing equipments. Mowers and combines. Earthmoving and land development machinery like scrapers, draglines, bulldozers and power trenchers. Dynamometers their types and principles of power brake dynamometer used for power measurements, cost estimation for taking of tractor. Ergonomics of man-machine-system. Haulage of agricultural and forest produce, land clearing.

2. Energy

Energy requirements in agricultural, different renewable energy sources, energy from the sun and wind, biomass gasification, producer gas and biogas for running I.C. engines and for electric power generation. Energy efficient cooking stoves and alternate cooking fuels, use of electricity for agriculture and agro industrial applications.

Section – B

3. Agricultural Process Engineering

Post Harvest Technology of crops and its scope, unit operations in processing of cereals, oil seeds and pulses. Screening principles of equipments for milling, mixing, sieving, grading, drying and storage of cereals, pulses and oil seeds, moisture content determination, physical properties, psychrometry , energy and material balances, solvent extraction, process flowsheet, properties of fruits and vegetables, food texture and rheology, process parameters and equipments for sorting, washing, handling, peeling, slicing, blanching, mixing and handling, crushing, packaging, transportation, storage and preservation technology, properties of dairy and food products, Process flow charts for product manufacturing. Working principles of equipments for removing, pasteurization, curd making, homogenization, filling and packaging, butter manufacturing, evaporation, drying, freezing, juice extraction, filtration, thermal processing. Material handling equipments – belt and screw conveyors, bucket elevators, their capacity and power requirements. Application for computer techniques in design calculations. Waste and by-product utilization of rice husk, rice bran, plant residues and oil cake.

6. **Electronics and Instrumentation**

Electronic devices and their characteristics, study of rectifiers, amplifiers, Oscillators, operational amplifiers, multivibrators, Digital circuit, sequential and combinational systems. Introduction to virtual instrument. Programming of micro processors and data acquisition unit covered in Agricultural Engineering processes. Generalized instrumentation system. Absolute and secondary measurements, Accuracy, precision, sensitivity and errors in measurements. Primary sensors and transducers, measuring instruments for current, voltage, electrical power flow, pressure, temperature, humidity, strain, force, torque and energy.

ANIMAL HUSBANDRY AND VETERINARY SCIENCE

Paper-I

SECTION - A

1. Animal Nutrition-Energy sources, energy, metabolism and requirements for maintenance and production of milk, meat, egg and wool. Evaluation of feeds as source of energy.

1.1. Threats to protein nutrition: sources, protein metabolism and synthesis, protein quantity and quality in relation to requirements, Energy protein ratios in rations.

1.2. Minerals in rations diet : Sources, functions, requirements and their relationship of the basic mineral nutrients including trace elements.

1.3. Vitamins, Hormones and Growth Stimulating substances : Sources, functions, requirements and interrelationship with minerals.

1.4. Advances in Ruminant Nutrition - Dairy Cattle: Nutrients and their metabolism with reference to milk production and its composition. Nutrient requirements for calves, heifers, dry and milking cows and buffaloes. Evaluation of various feeding systems.

1.5 Advances in Non-Ruminant Nutrition - Poultry : Nutrients and their metabolism with reference to poultry for meat and egg production. Nutrient requirements and feed formulation for layers and broilers at different ages.

1.6 Advances in Non-Ruminant Nutrition - Swine : Nutrients and their metabolism with special reference to growth and quality of meat production. Nutrient requirements and feed formulation for piglets, growing and finishing pigs.

1.7 Advances in Applied Animal Nutrition - A critical review and evaluation of feeding experiments, digestibility and balance studies. Feeding standards and measures of feed energy. Nutritional requirements for growth, maintenance and production. Balanced rations.

2. Animal Physiology

2.1 Growth and Animal Production: Prenatal and postnatal growth, maturation, growth curves, measures of growth, factors affecting growth, conformation, body composition, meat quality.

2.2 Milk Production and Reproduction : Current status of hormonal control of mammary development, milk secretion and milk ejection. Male and Female reproductive organs, their components and functions. Repeat breeding. Pregnancy diagnosis. Prolapse of reproductive organs. Digestive organs and their functions.

2.3 Environmental Physiology : Physiological relations and their regulation; mechanisms of adaptation, environmental factors and regulatory mechanism involved in animal behaviour. Methods of controlling climatic stress.

2.4 Semen quality : Preservation and Artificial Insemination-Components of semen and spermatozoa, chemical and physical properties of ejaculated semen, factors affecting semen in vivo and in vitro. Factors affecting semen production and quality. Preservation of semen. Composition of diluents, sperm concentration, transport of diluted semen. Deep Freezing techniques of semen. Detection of oestrus and time of insemination for better conception.

SECTION-B

3. Livestock Production and Management :

3.1 Commercial Dairy Farming : Comparison of dairy farming in India with advanced countries. Dairying under mixed farming and as a specialized farming, economic dairy farming. Starting of a dairy farm. Capital and land requirement, organization of the dairy farm. Procurement of inputs. Opportunities in dairy farming, factors determining the efficiency of dairy animal. Herd recording, budgeting, cost of milk production, pricing policy; Personnel Management. Developing Practical and Economic ration for dairy cattle; supply of greens throughout the year, feeds and fodder requirements of Dairy Farm. Feeding regimes for dry and young stock and bulls, heifers and milch animals, new trends in feeding young and adult stock. Feeding records. Age estimation through dentition.

3.2 Commercial meat, egg and wool production: Development of practical and economic rations for sheep, goats, pigs, rabbits and poultry. Supply of dry and green fodder, feeding regimes for young and mature stock. New trends in management for enhancing production. Capital and land requirements. Socio-economic concepts.

3.3 Feeding and management of animals under drought, flood and other natural calamities.

4. **Genetics and Animal Breeding :** Mendelian inheritance; deviations to Mendelian laws. Expression of genes. Linkage and crossing over. Sex determination, sex influenced and sex limited characters. Blood groups and polymorphism. Chromosome aberrations. Gene and its structure. DNA as a genetic material. Genetic code and protein synthesis. Recombinant DNA technology. Mutations and types of mutations, methods for detecting mutations and rate of mutation.

6.1 **Population Genetics applied to Animal Breeding:** Quantitative and qualitative traits; Hardy Weinberg Law; Population Vs. individual; Gene and genotypic frequency; Forces changing gene frequency; Random drift and small populations; Theory of path coefficient; Inbreeding; methods of estimating inbreeding coefficient; systems of inbreeding; Effective population size; Breeding value; estimation of breeding value; dominance and epistatic deviation; partitioning of variation; Genotype x environment correlation; genotype x environment interaction; Role of multiple measurements; Resemblance between relatives.

6.2 **Breeding Systems :** Heritability, repeatability, genetic and phenotypic correlations, their methods of estimation and precision of estimates; Aids to selection and their relative merits; Individual, pedigree, family and within family selection; Progeny testing; methods of selection; construction of selection indices and their uses; comparative evaluation of genetic gains through various selection methods; Indirect selection and correlated response; Inbreeding, upgrading, cross-breeding and synthesis of breeds; Crossing of inbred lines for commercial production; Selection for general and specific combining ability; open nucleus breeding system; synthetic population.

Paper-II

SECTION - A

1. Health and Hygiene

1.1 **Histology and Histological Techniques :** Methods of preparation and processing of tissues for histological examination; Microscopy - Bright field microscope and electron microscope. Cytology - structure of cell, organells and inclusions; cell division-cell types-Tissues and their classification-embryonic and adult tissues-Comparative histology of organs - vascular, nervous, digestive, respiratory, musculo-skeletal and urogenital systems-Endocrine glands-Integuments-sense organs.

1.2. **Embryology :** Embryology of vertebrates with special reference to aves and domestic mammals-gametogenesis-fertilization-germ layers-foetal membranes and placentation-Types of placenta in domestic mammals-Teratology-twins and twinning-organogenesis -germ layer derivatives -endodermal, mesodermal and ectodermal derivatives.

1.3 **Bovine Anatomy-Regional Anatomy :** Paranasal sinuses of ox-surface anatomy of salivary glands. Regional anatomy of infraorbital, maxillary, mandibuloalveolar, mental and cornual nerve block-Regional anatomy of paravertebral nerves, pudental nerve, median, ulnar and radial nerves-tibial, fibular and digital nerves-Cranial nerves-structures involved in epidural anaesthesia-superficial lymph nodes-surface anatomy of visceral organs of thoracic, abdominal and pelvic cavities-comparative features of locomotor apparatus and their application in the biomechanics of mammalian body.

1.4 **Anatomy of Fowls :** Musculo-skeletal system-Functional anatomy in relation to respiration and flying, digestion and egg production.

1.5 **Physiology of blood and its circulation, respiration, excretion, Endocrine glands in health and disease.**

1.5.1 **Blood constituents :** Properties and functions-blood cell formation-Haemoglobin synthesis and chemistry-plasma proteins production, classification and properties, coagulation of blood; Haemorrhagic disorders-anticoagulants-blood groups-Blood volume-Plasma expanders-Buffer systems in blood. Biochemical tests and their significance in disease diagnosis.

1.5.2 **Circulation:** Physiology of heart, cardiac cycle, heart sounds, heart beat, electrocardiograms. Work and efficiency of heart, effect of ions on heart function, metabolism of cardiac muscle, nervous and chemical regulation of heart, effect of temperature and stress on heart, blood pressure and hypertension, Osmotic regulation, arterial pulse, vasomotor regulation of circulation, shock. Coronary and pulmonary circulation, Blood-Brain barrier.

1.5.3 **Respiration :** Mechanism of respiration, Transport and exchange of gases, neural control of respiration, chemoreceptors, hypoxia, respiration in birds.

1.5.4 **Excretion:** Structure and function of kidney, formation of urine, methods of studying renal function, renal regulation of acid-base balance; physiological constituents of urine, renal failure, passive venous congestion, Urinary secretion in chicken. Sweat glands and their function. Biochemical tests for urinary dysfunction.

1.5.5 **Endocrine glands :** Functional disorders, their symptoms and diagnosis. Synthesis of hormones, mechanism and control of secretion, hormonal receptors, classification and function.

1.6 **General knowledge of pharmacology and therapeutics of drugs :** Cellular level of pharmacodynamics and pharmacokinetics. Drugs acting on fluids and electrolyte balance. Drugs acting on Autonomic nervous system. Modern concepts of anaesthesia and dissociative anaesthetics. Autacoids. Antimicrobials and principles of chemotherapy in microbial infections. Use of hormones in therapeutics. Chemotherapy of parasitic infections. Drugs and their residues in the edible tissues of animals. Chemotherapy of neoplastic diseases.

1.7 **Veterinary Hygiene with reference to water, air and habitation :** Assessment of pollution of water, air and soil. Importance of climate in animal health. Effect of environment on animal function and performance. Relationship between industrialisation and animal agriculture. Animal housing requirements for specific categories of domestic animals, viz., pregnant cows, milking cows, broiler birds, and layers. Stress, strain & productivity in relation to animal habitation.

3. **Veterinary Public Health**

3.1 **Zoonoses :** Classification, definition, role of animals and birds in prevalence and transmission of zoonotic diseases-occupational zoonotic diseases.

3.2 **Epidemiology :** Principles, definition of epidemiological terms, application of epidemiological measures in the study of diseases and disease control. Epidemiological features of air, water and food borne infections.

3.3 **Veterinary Jurisprudence :** Rules and Regulations of animal quarantine. Prevention of animal diseases. State Rules for prevention of animal and animal product borne diseases, S.P.C.A., vetero-legal cases-certificates-Materials and Methods of collection of samples for vetero-legal investigation.

4. **Extension :** Basic philosophy, objectives, concept and principles of extension. Different Methods adopted to educate farmers under rural conditions. Generation of technology, its transfer and feedback. Constraints in transfer of technology. Animal husbandry programmes for rural development.

SECTION - B

4. **Animal Diseases :**

4.1 Pathogenesis, symptoms, postmortem lesions, diagnosis and control of infectious diseases of cattle, pigs, poultry, horses, sheep and goats.

4.2 Etiology, symptoms, diagnosis, treatment of production diseases of cattle, pig and poultry.

4.3 Deficiency diseases of domestic animals and birds.

4.4 Diagnosis and treatment of non-specific conditions like impaction, Bloat, Diarrhoea, Indigestion, dehydration, stroke, poisoning.

4.5 Diagnosis and treatment of neurological disorders.

4.6 Principles and methods of immunization of animals against specific diseases-herd immunity-disease free zones-'zero' disease concept-chemoprophylaxis.

4.7 Anaesthesia-local, regional and general-preanesthetic medication. Symptoms and surgical interference in fractures and dislocation. Hernia, choking, abomasal displacement-Caesarian operations. Rumenotomy-Castrations. Surgical manipulations of fixation of joint and urinary obstructions.

4.8 Disease investigation techniques- collection of Materials for laboratory investigation- Establishment of Animal Health Centres-Procedure of despatching materials for lab investigation.

5. Milk and Milk Products Technology :

5.1 Milk Technology : Organization of rural milk procurement, collection and transport of raw milk. Quality, testing and grading raw milk. Quality storage. Grades of whole milk, Skimmed milk and cream.

Processing, packaging, storing, distributing and marketing of milk. Defects and their control. Nutritive properties of the following types of milk : Pasteurized, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined and flavoured milks. Preparation of milk cultures and their management, yoghurt, Dahi, Lassi and Srikhand. Preparation of flavoured and sterilized milk. Legal standards. Sanitation requirement for clean and safe milk and milk plant equipment.

5.2 Milk Products Technology : Selection of raw materials, assembling, production, processing, storing, distributing and marketing of milk products such as Butter, Ghee, Khoa, Channa, Cheese; Condensed, evaporated, dried milk and baby food; Ice cream and Kulfi; by-products, whey products, butter milk, lactose and casein. Testing, Grading, Judging of milk products BIS and Agmark specifications, legal standards, quality control and nutritive properties. Packaging, processing and operational control.

6. Meat Hygiene and Technology :

6.1 Meat Hygiene :

6.1.1 Ante-mortem care and management of food animals, stunning, slaughter and dressing operations; abattoir requirements and designs; Meat inspection procedures and judgement of carcass meat cuts-grading of various meat cuts-duties and functions of Veterinarians in wholesome meat production.

6.1.2 Hygienic methods of handling meat-spoilage of meat and control measures-Post slaughter physicochemical changes in meat and factors that influence them-Quality improvement methods-Adulteration of meat and detection-Regulatory provisions in Meat trade and Industry.

6.2 Meat Technology :

6.2.1 Physical and chemical characteristics of meat-meat emulsions-methods of preservation of meat-curing, canning, irradiation, packaging of meat and meat products. Meat products and their formulations.

1.3. **By-products** : Slaughter house, by-products and their utilization Edible and inedible by-products-social and economic implications of proper utilization of slaughter house by-products- Organ products for food and pharmaceuticals.

1.4. **Poultry Product Technology** : Chemical composition and nutritive value of poultry meat, pre-slaughter care and management. Slaughtering techniques, inspection, preservation of poultry meat and products. Legal and BIS standards. Structure, composition and nutritive value of eggs. Microbial spoilage. Preservation and maintenance. Marketing of poultry meat, eggs and products.

1.5. **Rabbit/Fur Animal Farming** : Care and management of rabbits. Disposal and utilization of fur and wool and recycling of waste by-products.

ANTHROPOLOGY

Paper –I

Physical/Biological Anthropology & Human Genetics

Unit –I:

1.1 Meaning and Scope of Anthropology

1.2 Relationship with other disciplines : History, Archeology, Geology, Economics, Political Sciences, Psychology, Life Sciences, and Medical Sciences

1.3 Main Branches of Anthropology, their scope and interrelations

a) Social/Cultural Anthropology
b) Physical/Biological Anthropology
c) Archaeological Anthropology

1.4 Living Primates

Order Primates and Classification of Primates, Comparative morphology, anatomy and physiology of man and apes.

Primate Locomotion: Terrestrial and Arboreal adaptation. Skeletal changes due to assumption of erect posture.

1.5 Fossil Evidences of Human Evolution (Phylogenetic status, characteristics and distribution)

a) Pre-australopithecus (Fossil primates) (Dryopithecus)
b) South and East African Australopithecines (Plesianthropus/Australopithecus Africanus, Paranthropus, Australopithecus)
c) Pithecanthropus – Homo erectus, Homo Erectus Javanicus, Homo Erectus Pekinensis)
d) Homo Heidelbergensis
e) Neanderthal Man – i.e. Classic (Le Chapelle Aux Saints (classical type), Mt. Carmel (hybrid type) (Progressive type)
f) Rhodesian Man
g) Homo Sapiens – Cro-Magnon, Grimaldi, Chancelade.

1.6 Organic Evolution

Theories of evolution in historical perspective, Pre-Darwinian, Darwinian and Post-Darwinian Period (Neo-Darwinism). Modern Synthetic theory of evolution. Brief outline of views and concepts of evolutionary biology: parallelism, convergence, adaptive radiation, neutral evolution.

1.7 Human Race

Concept of Race and society. Biological perspective of race. Different factors responsible for race formation and racial criteria. Role of heredity and environment in determining racial traits. Major races of the world, their distribution and characteristics. Race crossing in man.

Unit - II:

2.1 Concept, scope and major branches of human genetics. Methods for study of genetics principles in human heredity. Pedigree study. Family study. Twin Study. Cytogenetic Method and Biochemical.

2.2 Mendelian population. Concept of gene pool and gene frequencies. Hardy Weinberg equilibrium. The factors, which influence gene and genotype frequencies – mutation, isolation, migration, admixture, selection, genetic drift, inbreeding and assortative mating.

2.3 Consanguineous and non-consanguineous marriage. Effect of consanguineous marriages.

2.4 Mendelian Genetics in Man. Autosomal Inheritance. Rare Dominant and Rare Recessive inheritance. Inheritance of abnormal traits like haemophilia, thalassemia and colour blindness, Sickle Cell anaemia, Albinism, Achondroplasia, Hairy pinna, Brachydactyly and Cleft Palate.

2.5 Linked and Sex Linked Sex Limited Genes. Multifactorial and Polygenic inheritance in Man. Sex Chromosomal abnormalities: Klinefelter, Turner, Super female and Intersex.

2.6 Autosomal aberrations: Down Syndrome, Edward and Cri-du-chat Syndromes. Chromosome structure and control by gene activity.

2.7 Population variation in genetic markers. ABO, Rh Blood Groups.

3.8 Genetic Counseling: Diagnosis of genetic diseases in Man. Mode of inheritance and Risk assessment. Prenatal diagnosis of genetic diseases, indications for pre-natal diagnosis. Techniques for pre-natal diagnosis. Genetic disease and Gene Therapy. Gene mapping and Genome Study.

Unit –III

Concept of Human Growth and development. Stages of Growth – prenatal, natal, infant, childhood, adolescence and maturity.

Factors affecting growth and development – Genetic, Environmental, Hormonal, Nutritional, Cultural and Socio-economic.

Ageing and senescence. Theories and observations – Biological and chronological longevity. Human physique and somatotypes. Methods for growth studies.

Unit – IV

Concept of Reproductive Ecology, demography and population study. Reproductive physiology of male and female. Biological aspects of human fertility. Relevance of menarche, menopause and other biomarkers to fertility. Fertility patterns and differentials.

Demographic Theories – biological, social and cultural. Demographic methods – census, registration systems, sample survey methods.

Population structures and population dynamics. Demographic rates and ratios. Life tables – structure and utility.

Biological and socio-ecological factors influencing fecundity, fertility, sterility and mortality. Methods of studying population growth. Biological consequences of population control and family welfare.

Unit – V

Application of Physical/Biological Anthropology. Applied human genetics – Paternity diagnosis, genetic counseling and eugenics. Methods and principles of personal identification and reconstruction. Application of Statistical principles in human genetics and Physical Anthropology. Reproductive and cytogenetics in reproductive biology. DNA technology – prevention and cure of diseases.

Anthropometry in designing of defence and other equipments. Nutritional Anthropometry. Forensic Anthropology. Anthropogenomics in medicine. Anthropology of sports.

Unit – VI:

Cultural Evolution – broad outlines of pre-historic cultures in Europe and India

a) Palaeolithic
b) Mesolithic
c) Neolithic
d) Chalcolithic
e) Copper-Bronze Age
f) Iron Age.

Unit – VII:

Family: Definition and types of family, household, Impact of urbanization, industrialization, education and feminist movements. Universality of family – a critique.

Kinship: Definition of kinship, locus and exogamy. Principles of descent, types and functions. Unilineal, bilateral and double descent. Descent, Residence and complementary Filiation. Kinship terminology and Alliance theory.

Marriage: Definition and types, mode of acquiring mates. Regulation of marriage – preferential and prescriptive. Marriage, prestation, dowry and bride price.

Religion: Definition and functions of religion. Anthropological approaches to the study of religion – evolutionary, psychological and functional. Magic, witchcraft and society: definitions. Functions of key functionaries i.e. priest, shaman, medicine man and sorcerer.

Primitive Economy: Economic Anthropology: Modes of subsistence, hunting gathering, fishing, pastoralism, horticulture. Exchange: gift, barter, trade, commercial exchange and market economy.

Types of political organization – band, tribe, chiefdom, state, concept of power, authority and legitimacy, social control, law and justice in tribal societies.

Social structure and social organization, Role Analysis and social network. Institutions and groups. Social stratification, principles and forms, caste and class, social mobility.

Unit – VIII:

Culture: definition and nature, paradoxes of culture.

Approaches to the study of culture and society – classical evolutionism, neo-evolutionism, cultural ecology, historical particularism and diffusionism, structural-functionalism, culture and personality, structuralism, symbolism, cognitive approach and new ethnography, post-structuralism and post-modernism.

Unit – IX:

Concepts of development: Concepts of planning and planned development. Concept of participatory development. Anthropology and Resettlement. Culture ecology and sustainable development. Explanations in anthropological perspectives. Types of comparative methods in social and cultural anthropology. Positivistic approaches.

Unit – X:

Basic techniques of data collection: Interview & observation, participant and non participant, schedules, questionnaire, case study methods, extended case study methods, life histories, genealogical method, Participatory Rapid Rural Appraisal(PRA), Focused Group Discussion (FGD). Analysis, Interpretation and Presentation of data.

Unit – XI:

Ethnicity in understanding of contemporary society. Dynamics of ethnicity at rural, tribal, urban and international levels. Ethnic conflicts and political developments. Concept of ethnic boundaries. Ethnicity and concept of nation state.

Unit – XII:

Concepts and Methods of Ecological Anthropology. Adaptation – social and cultural. Deterministic theories – ecological. Resources – biological, technological and sustainable development. Biological adaptation – climatic, environmental, nutritional and genetic.

Paper –II

Indian Society and Culture

Unit-I:

Tribal situation in India – Linguistic variability, linguistic and socio-economic characteristics of the tribal populations and their distribution. Problems of the tribal communities – land alienation, poverty, indebtedness, rural literacy, unemployment, malnutrition, Development Impact of Projects – problems and issues of Tribal Rehabilitation and Resettlement.

Forest Policy and tribals. Impact of reforestation and Industrialization on tribal and rural populations.

Unit-II:

Demographic Profile of India – salient and linguistic elements in the Indian Population and their distribution.

Unit–III:

The basic structure and nature of traditional Indian Social System – a critique. Varnashrama, Purushartha, Karma, Rebirth. Theories on the origin of Caste System, Jajmani System. Structural basis of inequality in traditional Indian Society. Impact of Buddhism, Jainism, Islam and Christianity on Indian Society.

Unit – IV:

Development, Growth and Development of Anthropology in India – contribution of the 18th century and early 20th Century scholars and administrators. Contributions of Indian Anthropologists to tribal and rural studies.

Unit–V:

Salient characteristic features of Indian Society. Approaches in the study of Indian Society and Culture. Village studies in India, Changing village India. Linguistics and religious minorities – social, political and economic status.

Unit–VI

Problems of exploitation and deprivation of Scheduled Castes/Scheduled Tribes and Other Backward Classes. Protective legislation for Scheduled Tribes and Scheduled Castes. Social change and contemporary tribal societies. Impact of modern democratic institutions, PESA Act, impact of development programmes and welfare measures on tribals and weaker sections. Emergence of ethnicity, tribal movements and quest for identity.

Unit–VII

Social change and Development among the tribes during colonial and post-independence India.

Unit–VIII

History of administration of tribal areas, tribal policies, plans, programmes of tribal development and their implementation. Role of NGOs. Role of Anthropology in tribal and rural development. Contributions of Anthropology to the Understanding of regionalism, communalism, ethnic and political movements.

BOTANY

PAPER-I

Section-A

1. Microbiology and Plant Pathology: Structure and reproduction of viruses and bacteria; Plasmids and their significance; Gene transfer in bacteria (Transformation, Transduction, Conjugation); Applications of microbes in agriculture, industry, medicine and pollution control; General account of infection, Phytoimmunology. Important plant diseases caused by viruses, bacteria, mycoplasma and fungi. Mode of infection and dissemination. Molecular basis of infection and disease resistance/defence. Physiology of parasitism, Fungal toxins.

2. Cryptogams and Gymnosperms : Study of structure and reproduction of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms from evolutionary viewpoint, their distribution in India and their economic potential.

3. Angiosperms : Comparative account of various systems of Angiosperm Classification : Study of angiospermic families-Magnoliaceae, Ranunculaceae, Brassicaceae (Cruciferae), Rosaceae, Leguminosae, Euphorbiaceae, Malvaceae, Dipterocarpaceae, Apiaceae (Umbelliferae), Asclepiadaceae, Verbenaceae, Solanaceae, Rubiaceae, Cucurbitaceae, Asteraceae (Compositae), Poaceae (Gramineae), Arecaceae (Palmae), Liliaceae, Musaceae, Orchidaceae.

Section-B

4. Anatomy, Embryology and Biostatistics : Anatomy – Structure and function of primary and secondary tissues. Meristematic tissue system, Conducting tissue system, Vascular tissue system, Stomata and their types. Anomalous secondary growth, Anatomy of C_3 and C_4 plants.

Embryology : Development of male and female gametophytes, Pollination, Fertilization, Endosperm and its function, Embryo and patterns of embryo development. Polyembryony and apomixis, Applications of palynology.

Biostatistics: Central tendency, Dispersion, Unbiased and hypothesis testing, Significance of standard error, Probability distribution (normal, binomial, poisson), t-test, F-test, Chi-square test, Correlation and regression.

5. Plant Utility and Exploitation: Origin of cultivated plants, Vavilov's centres of origin. Plants as sources for food, fodder, fibres, spices, beverages, drugs, narcotics, insecticides, timber, gums, resins and dyes, latex, cellulose, starch and their products; Perfumery; Importance of Ethnobotany in Indian context; Energy plantation; Botanical Gardens and Herbaria.

6. Plant Tissue Culture : Totipotency, requirements for plant tissue culture, cell, tissue, organ culture, polarity, symmetry and differentiation. Cell, tissue and organ culture. Protoplast isolation and culture. Somatic hybrids and Cybrids.

PAPER-II

Section-A

1. **Cell Biology:** Techniques of Cell Biology. Prokaryotic and eukaryotic cells- structural and ultrastructural details; Structure and function of extracellular matrix or ECM (cell wall) and membranes-cell adhesion, Membrane transport and vesicular transport; Structure and function of cell organelles (chloroplasts, mitochondria, ER, ribosomes, endosomes, lysosomes, peroxisomes, hydrogenosome); Nucleus, Nucleolus, Nuclear pore complex; Chromatin and Nucleosome; Cell signalling and cell receptors; Signal transduction (G-proteins, etc.); Mitosis and Meiosis; Molecular basis of cell cycle; Numerical and structural variations in chromosomes and their significance; Study of polytene, lampbrush and B-chromosomes: structure, behaviour and significance.

2. **Genetics, Molecular Biology and Evolution:** Development of genetics; Gene versus allele concepts (Pseudoalleles); Quantitative genetics and multiple factors; Linkage and crossing over - methods of gene mapping including molecular maps (idea of mapping function); Sex chromosomes and sex-linked inheritance; Sex determination and Molecular basis of sex differentiation; Mutation (biochemical and molecular basis); Cytoplasmic inheritance and cytoplasmic genes (including genetics of male sterility); Prions and prion hypothesis; Structure and synthesis of nucleic acids and proteins; Genetic code and regulation of gene expression; Multigene families; Organic evolution - evidences, mechanism and theories; Role of RNA in origin and evolution.

3. **Plant Breeding and Plant Biotechnology:** Methods of plant breeding - introduction, selection and hybridization (pedigree, backcross, mass selection, bulk method); Male sterility and heterosis breeding; Use of apomixis in plant breeding; Use of molecular markers in plant breeding.

Direct gene transfer methods – Particle gun bombardment, Electroporation, Chemical methods; Agrobacterium – mediated gene transfer; Biology of "Crown gall" and "Hairy root" diseases, Ti and Ri plasmids, T-DNA organization and transfer; Screening of transgenic plants; Role of selectable markers and reporter genes; Application of plant transformation for crop improvement – Development of insect-, herbicide-, virus-, fungus- resistant transgenic plants.

Section-B

4. Plant Physiology and Biochemistry : Water relations, Mineral nutrition and ion transport, mineral deficiencies. Photosynthesis-photochemical reactions, photophosphorylation and carbon pathways C_3, C_4 and CAM pathways; Photorespiration; Respiration anaerobic and aerobic, including fermentation; Electron transport chain and oxidative phosphorylation; Chemiosmotic theory and ATP synthesis; Nitrogen fixation and Nitrogen metabolism; Enzymes, coenzymes; energy transfer and energy conservation; Importance of secondary metabolites.

5. Growth, Development and Stress Physiology : Photomorphogenesis; Pigments as photoreceptors (plastidial pigments and phytochrome); Photoperiodism and flowering, vernalization, senescence; Growth substances-their chemical nature, role and applications in agri-horticulture; Kinetics of growth, growth movements; Dormancy, storage and germination of seeds; Fruit ripening - its molecular basis and manipulation. Fruit and seed physiology; Stress physiology (heat, water, salinity, metal).

6. Plant Ecology and Plant Geography: Ecological factors; Concepts and dynamics of community; Plant succession; Concepts of biosphere; Ecosystems and their conservation; Pollution and its control (including phytoremediation).

Forest types of India - afforestation, deforestation and social forestry; Endangered plants, endemism and Red Data Books; Biodiversity; Convention of Biological Diversity, Sovereign Rights and Intellectual Property Rights; Biogeochemical cycles; Global warming; Forests of Odisha.

CHEMISTRY

PAPER-I

1. Atomic structure

Quantum theory, Heisenberg's uncertainty principle, Schrodinger wave equation (time independent). Interpretation of wave function, particle in one-dimensional box, quantum numbers, hydrogen atom wave functions. Shapes of s, p, d and f orbitals.

2. Chemical bonding

Ionic bond, characteristics of ionic compounds, factors affecting stability of ionic compounds, lattice energy, Born-Haber cycle; covalent bond and its general characteristics, polarities of bonds in molecules and their dipole moments. Valence Bond Theory (VBT), concept of resonance and resonance energy. Molecular Orbital Theory (MOT): bonding in homonuclear diatomic molecules: H_2^+, H_2 to Ne_2, MOT treatment of NO, CO, HF, CN, CN^-, BeH_2 and CO_2. Comparison of VBT and MOT, bond order, bond strength, bond length, dipole moment.

3. Solid State

Forms of solids, law of constancy of interfacial angles, crystal systems and crystal classes (crystallographic groups). Designation of crystal faces, lattice structures and unit cell. Laws of rational indices. Bragg's law. X-ray diffraction by crystals. Close packing, radius ratio rules, calculation of some limiting radius ratio values. Structures of NaCl, ZnS, CsCl, CaF_2, CdI_2 and rutile. Defects in crystals, stoichiometric and nonstoichiometric defects, impurity defects, semi-conductors. Elementary study of liquid crystals.

4. The gaseous state

Equation of state for real gases, intermolecular interactions, liquefaction of gases and critical phenomena, Maxwell's distribution of speeds, intermolecular collisions, collisions on the wall and effusion.

5. Thermodynamics and statistical thermodynamics

First law of thermodynamics, work and heat absorbed in different types of processes; calorimetry, energy and enthalpy changes in various processes and their temperature dependence.

Second law of thermodynamics; entropy as a state function, entropy changes in various processes, entropy-reversibility and irreversibility. Nernst heat theorem and third law of thermodynamics.

Micro and macro states; canonical ensemble and canonical partition function; electronic, rotational and vibrational partition functions and thermodynamic quantities; chemical equilibrium in ideal gas reactions.

6. Phase equilibria and solutions

Phase equilibria in pure substances, phase diagram for a pure substance, phase equilibria in binary systems, partially miscible liquids-upper and lower critical solution temperatures, partial molar quantities, their significance and determination, excess thermodynamic functions and their determination.

7. Electrochemistry

Debye-Huckel theory of strong electrolytes and Debye-Huckel limiting Law for various equilibrium and transport properties.

Galvanic cells, concentration cells, electrochemical series, measurement of e.m.f. of cells and its applications fuel cells and batteries.

Processes at electrodes, double layer at the interface, rate of charge transfer, current density, components, electroanalytical techniques-voltammetry, polarography, amperometry, cyclic voltametry, ion selective electrodes and their use.

8. Chemical kinetics

Concentration dependence of rate of reaction, differential and integral rate equations for zeroth, first, second and fractional order reactions. Rate equations involving reverse, parallel, consecutive and chain reactions, effect of temperature and pressure on rate constant, study of fast reactions by stop-flow and relaxation methods. Collisions and reaction rate theories.

9. Photochemistry

Absorption of light, decay of excited state by different routes, photochemical reactions between hydrogen and halogens and their quantum yields.

10. Surface phenomena and catalysis

Absorption from gases and solutions on solid adsorbents, absorption isotherms-Langmuir, Gibbs and Freundlich isotherms, determination of surface area, characteristics and mechanism of reaction on heterogeneous catalysts.

11. Bio-inorganic chemistry

Metal ions in biological systems and their role in transmission across the membranes (molecular mechanism), ionophores, photosynthesis-PSI, PSII, nitrogen fixation, oxygen uptake proteins, cytochromes and ferredoxins.

12. Coordination chemistry

(a) Electronic configurations; introduction to theories of bonding in transition metal complexes. Valence bond theory, crystal field theory and its modifications; applications of theories in the explanation of magnetism and electronic spectra of metal complexes.

(b) Isomerism in coordination compounds. IUPAC nomenclature of coordination compounds; stereochemistry of complexes with 4 and 6 coordination numbers; chelate effect and polynuclear complexes; trans effect and its theories; kinetics of substitution reactions in square-planar complexes; thermodynamic and kinetic stability of complexes.

(c) Synthesis and structures of metal carbonyls, carboxylate anions, carbonyl hydrides and metal nitrosyl compounds.

(d) Complexes with aromatic systems, synthesis, structure and bonding in metal olefin complexes, alkyne complexes and cyclopentadienyl complexes; coordinative unsaturation, oxidative addition reactions, insertion reactions, fluxional molecules and their characterization. Compounds with metal-metal bonds and metal atom clusters.

13. General chemistry of 'f' block elements

Lanthanides and actinides; separation, oxidation states, magnetic and spectral properties; lanthanide contraction.

14. Non-Aqueous Solvents

Reactions in liquid NH_3, HF, SO_2 and H_2SO_4. Failure of solvent system concept, coordination model of non-aqueous solvents. Some highly acidic media, fluorosulphuric acid and super acids.

Paper II

1. **Delocalized covalent bonding** : Aromaticity, antiaromaticity, Homo-aromaticity, non-aromaticity, annulenes, azulenes, tropylium salts, fulvenes, sydnones.

2. **Reaction mechanisms** : General methods (both kinetic and non-kinetic) of study of mechanism of organic reactions illustrated by examples-use of isotopes, cross-over experiment, intermediate trapping, stereochemistry; energy diagrams of simple organic reactions, transition states and intermediates; energy of activation; thermodynamic control and kinetic control of reactions.

(b) **Reactive intermediates** : Generation, geometry, stability and reactions of Carbocations, carbanions, free radicals, carbenes, benzynes, nitrenes and enamines.

(c) **Substitution reactions** : S_N1, S_N2, S_Ni, S_N1', S_N2', S_Ni' and $S_{RN}1$ mechanisms; neighbouring group participation; electrophilic and nucleophilic reactions of aromatic compound including simple heterocyclic compounds-pyrrole, furan, thiophene, indole.

(d) **Elimination reactions** : E1, E2 and E1cB mechanisms; orientation in E2 reactions-Saytzeff and Hoffmann; pyrolytic syn elimination-acetate pyrolysis, Chugaev and Cope eliminations.

(e) **Addition reactions** : Electrophilic addition to C=C and C≡C; Nucleophilic addition to C=O, C≡N, conjugated olefins and carbonyls.

(f) **Rearrangements** : Pinacol-pinacolone, Hoffmann, Beckmann, Baeyer-Villiger, Favorskii, Fries, Claisen, Cope, Stevens and Wagner-Meerwein rearrangements.

7. **Pericyclic reactions** : Classification and examples; Woodward-Hoffmann rules-electrocyclic reactions, cycloaddition reactions [2+2 and 4+2] and sigmatropic shifts [1, 3; 3, 3 and 1, 5], FMO approach.

8. **Chemistry and mechanism of reactions** : Aldol condensation (including directed aldol condensation), Claisen condensation, Dieckmann, Perkin, Knoevenagel, Wittig, Clemmensen, Wolff-Kishner, Cannizzaro and von Richter reactions; Stobbe, benzoin and acyloin condensations; Fischer indole synthesis, Skraup synthesis, Bischler-Napieralski, Sandmeyer, Reimer-Tiemann and Reformatsky reactions.

9. **Polymeric Systems**

(a) **Physical chemistry of polymers** : Polymer solutions and their thermodynamic properties; number and weight average molecular weights of polymers. Determination of molecular weights by sedimentation, light scattering, osmotic pressure, viscosity, end group analysis methods.

(b) **Preparation and properties of polymers** : Organic polymers-polyethylene, polystyrene, polyvinyl chloride, Teflon, nylon, terylene, synthetic and natural rubber. Inorganic polymers-phosphonitrilic halides, borazines, silicones and silicates.

(c) **Biopolymers** : Basic bonding in proteins, DNA and RNA.

6. **Synthetic uses of reagents** : OsO_4, HIO_4, CrO_3, $Pb(OAc)_4$, SeO_2, NBS, B_2H_6, Na-Liquid NH_3, $LiAlH_4$, $NaBH_4$, n-BuLi, MCPBA.

7. **Photochemistry :** Photochemical reactions of simple organic compounds, excited and ground states, singlet and triplet states, Norrish-Type I and Norrish-Type II reactions, Paterno-Buchi, Di-π methane rearrangements.

8. **Principles of spectroscopy and applications in structure elucidation**

(i) **Rotational** spectra-diatomic molecules; isotopic substitution and rotational constants.

(ii) **Vibrational** spectra-diatomic molecules, linear triatomic molecules, specific frequencies of functional groups in polyatomic molecules.

(iii) **Electronic spectra :** Singlet and triplet states. n→π* and π→π* transitions; application to conjugated double bonds and conjugated carbonyls-Woodward-Fieser rules.

(iv) **Nuclear magnetic resonance :** Isochronous and anisochronous protons; chemical shift and coupling constants; Application of 1H NMR to simple organic molecules.

(v) **Mass spectra :** Parent peak, base peak, daughter peak, metastable peak, fragmentation of simple organic molecules; α-cleavage, McLafferty rearrangement.

(vi) **Electron spin resonance :** Inorganic complexes and free radicals.

CIVIL ENGINEERING

Paper-I

Part-A

Engineering Mechanics, Strength of Materials and Structural Analysis:

Engineering Mechanics :

Units and Dimensions, SI Units, Vectors, Concept of Force, Concept of particle and rigid body. Concurrent, Non Concurrent and parallel forces in a plane, moments of force and Varignon's theorem, free body diagram, conditions of equilibrium, Principle of virtual work, equivalent force system.

First and Second Moment of area, Mass moment of Inertia.

Static friction, Inclined Plane and bearings.

Kinematics and Kinetics :

Kinematics in Cartesian and Polar Co-ordinates, motion under uniform and non-uniform acceleration, motion under gravity. Kinetics of particle : Momentum and Energy principles, D' Alembert's Principle, Collision of elastic bodies, rotation of rigid bodies, simple harmonic motion, Flywheel.

Strength of Materials :

Simple Stress and Strain, Elastic constants, axially loaded compression members, Shear force and bending moment, theory of simple bending, Shear stress distribution across cross sections, Beams of uniform strength, Leaf spring, Strain Energy in elastic stress, bending & shear.

Deflection of Beams : Macaulay's method, Moir's Moment area method, Conjugate beam method, unit load method. Torsion of Shafts, Transmission of power, close coiled helical springs, Elastic stability of columns, Euler's Rankine's and Secant formulae. Principal Stresses and Strains in two dimensions, Mohr's Circle, Theories of Elastic Failure, Thin and Thick cylinder : Stresses due to internal and external pressure Lame's equations.

Structural Analysis :

Castigliano's theorems I and II, unit load method of consistent deformation applied to beams and pin jointed trusses. Slope-deflection, moment distribution, Kani's method of analysis and column Analogy method applied to indeterminate beams and rigid frames.

Rolling loads and Influences lines : Influence lines for Shear Force and Bending moment at a section of beam. Criteria for maximum shear force and bending Moment in beams traversed by a system of moving loads. Influences lines for simply supported plane pin jointed trusses.

Arches : Three hinged, two hinged and fixed arches, rib shortening and temperature effects, influence lines in arches.

Matrix methods of analysis : Force method and displacement method of analysis of indeterminate beams and rigid frames.

Plastic Analysis of beams and frames : Theory of plastic bending, plastic analysis, statical method, Mechanism method.

Unsymmetrical bending : Moment of inertia, product of inertia, position of Neutral Axis and Principle axes, calculation of bending stresses.

SDOF & MDOF: Response spectra, nature of Earthquake forces, Frequency and mode shapes, IS 1893, simple methods of design.

CAD and Computer Applications in Civil Engineering : Simple programming in FORTRAN and C++, awareness on AUTOCAD, STAAD/SAP. Simple computations on earthworks, road works, analysis of rates, and estimation.

Part-D

Design of Structures : Steel, Concrete and Masonry Structures.

(BIS, Railway & IRC Codes are permitted)

Structural Steel Design:

Structural Steel : Factors of safety and load factors. Riveted, bolted and welded joints and connections. Design of tension and compression member, beams of built up section, riveted and welded plate girders, gantry girders, stanchions with battens and lacings, slab and gusseted column bases.

Design of highway and railway bridges : Introduction to Railway codes. Through and deck type plate girder, Warren girder, Pratt truss.

Design of Concrete and Masonry Structures :

Concepts of mix design, Reinforced Concrete : Working Stress and Limit State method of design–Recommendations of I.S. Codes,Design of one way and two way slabs, staircases slabs, simple and continuous beams of rectangular, T and L sections. Compression members-under direct load with or without eccentricity, Isolated and combined footings.

Cantilever and Counterfort type retaining walls.

Water tanks : Design requirements for Rectangular and circular tanks resting on ground, Intze tanks.

Prestressed concrete : Methods and systems of prestressing, anchorages, Analysis and design of sections for flexure based on working stress, Loss of prestress.

Design of Brick masonry as per I.S. Codes.

Design of reinforced masonry retaining walls.

Part-C

Fluid Mechanics, Open Channel Flow and Hydraulic Machines

Fluid Mechanics : Fluid properties and their role in fluid motion, fluid static including forces acting on plane and curve surfaces.

Kinematics and Dynamics of Fluid Flow : Velocity and accelerations, stream lines, equations of continuity, irrotational and rotational flow, velocity potential and stream functions, flownet, methods of drawing flownet, sources and sinks, flow separation, free and forced vortices.

Control volume equation, continuity, momentum, energy and moment of momentum equations, their relative volume equation, Navier-Stokes equation, Euler's equation of motion, application to fluid flow problems, pipe flow, plane, curved, stationary and moving vanes, sluice gates, weirs, orifice meters and Venturi meters.

Dimensional Analysis and Similitude : Buckingham's Pi-theorem, dimensionless parameters, similitude theory, model laws, undistorted and distorted models.

Laminar Flow : Laminar flow between parallel, stationary and moving plates, flow through circular pipes.

Boundary layer : Laminar and turbulent boundary layer on a flat plate, laminar sublayer, smooth and rough boundaries, drag and lift.

Turbulent flow through pipes : Characteristics of turbulent flow, velocity distribution and variation of pipe friction factor, hydraulic grade line and total energy line, siphons, expansion and contractions in pipes, pipe networks, water hammer in pipes and surge tanks.

Open channel flow : Uniform and non-uniform flows, momentum and energy correction factors, specific energy and specific force, critical depth, resistance equations and variation of roughness coefficient, rapidly varied flow, flow in contractions, flow at sudden drop, hydraulic jump and its applications, surges and waves, gradually varied flow, classification of surface profiles, control section, step method of integration of varied flow equation, standing surges and hydraulic bore.

Hydraulic Machines and Hydropower :

Centrifugal pumps—Types, characteristics, Net Positive Suction Head (NPSH), specific speed, Pumps in parallel.

Reciprocating pumps, Air Vessels, Hydraulic ram, efficiency parameters, Rotary and positive displacement pumps, diaphragm and jet pumps.

Hydraulic turbines, Types classification, Choice of turbines, performance parameters, controls, characteristics, specific speed.

Principles of hydropower development, Type, layouts and Components works, Surge tanks, types and choices, Flow duration curves and dependable flow, Storage and pondage, Pumped storage plants, Special features of arid, snow hydel plants.

Part-B

Geotechnical Engineering

Types of soil, phase relationships, consistency limits, particle size distribution, clay fractions of soil.

Capillary water and structural water, effective stress and pore water pressure, Darcy's Law, Factors affecting permeability, determination of permeability, permeability of stratified soil deposits.

Seepage pressure, quick sand condition, compressibility and consolidation, Terzaghi's theory of one dimensional consolidation, consolidation test.

Compaction of soil, field control of compaction, Total stress and effective stress parameters, pore pressure coefficients.

Shear strength of soils, Mohr Coulomb failure theory, Shear tests.

Earth pressure at rest, active and passive pressures, Rankine's theory, Coulomb's wedge theory, earth pressure on retaining wall, sheetpile walls, Braced excavation.

Evaluation of Bearing capacity, Terzaghi and other important theories, net and gross bearing pressure, IS 6403.

Immediate and consolidation settlements, use of IS8009.

Stability of slope, Total Stress and Effective Stress methods, Conventional methods of slices, stability number.

Subsurface exploration, methods of boring, sampling, penetration tests, pressure meter tests.

Essential features of foundation, types of foundation, design criteria, choice of type of foundation, stress distribution in soils, Boussinessq's theory, Newmarks's chart, pressure bulb, contact pressure, applicability of different bearing capacity theories, evaluation of bearing capacity from field tests, allowable bearing capacity, Settlement analysis, allowable settlement.

Proportioning of footing, isolated and combined footings, rafts, buoyancy rafts, Pile foundation, types of piles, pile capacity, static and dynamic analysis, design of pile groups, pile load test, settlement of piles, lateral capacity, Foundation for Bridges, Ground improvement techniques-preloading, sand drains, stone column, grouting, soil stabilisation.

Paper-II

Part-A

Construction Technology, Equipment, Planning and Management :

1. Construction Technology :

Engineering Materials :
Physical properties of construction materials : Stones, Bricks and Tiles; Lime, Cement and Surkhi Mortars; Lime Concrete and Cement Concrete, Properties of freshly mixed and hardened concrete, Flooring Tiles, use of ferro-cement, fibre-reinforced and polymer concrete, high strength concrete and light weight concrete. Timber : Properties and uses; defects in timber, seasoning and preservation of timber. Plastics, rubber and damp-proofing materials, termite proofing, Materials for Low cost housing.

Construction :

Building components and their functions, Brick masonry : Bonds, jointing. Stone masonry. Design of Brick masonry walls as per I.S. codes, factors of safety, serviceability and strength requirements; plastering, pointing. Types of Floors & Roofs. Ventilation. Repairs in buildings.

Functional planning of building : Building orientation, circulation, grouping of areas, privacy concept and design of energy efficient building; provisions of National Building Code.

Building estimates and specifications; Cost of works, valuation.

2. Construction Equipment :

Standard and special types of equipment, Preventive maintenance and repair, factors affecting the selection of equipment, economical life, time and motion study, capital and maintenance cost.

Concreting equipments : Weigh batcher, mixer, vibrator, batching plant, Concrete pump.

Earth-work equipment : Power shovel hoe, bulldozer, dumper, trailers and tractors, rollers, sheep foot roller.

3. Construction Planning and Management : Construction activity, schedules, job layout, bar charts, organization of contracting firms, project control and supervision. Cost reduction measures.

Network analysis : CPM and PERT analysis. Float Times, crashing of activities, contraction of network for cost optimization, up dating, Cost analysis and resource allocation.

Elements of Engineering Economics, methods of appraisal, present worth, annual cost, benefit-cost, incremental analysis. Economy of scale and size. Choosing between alternatives including levels of investments. Project profitability.

Part-B

Survey and Transportation Engineering

Survey : Common methods of distance and angle measurements, plane table survey, levelling traverse survey, triangulation survey, corrections, and adjustments, contouring, topographical map. Surveying instruments for above purposes. Tachometry. Circular and transition curves. Principles of photogrammetry.

Railways : Permanent way, sleepers, rail fastenings, ballast, points and crossings, design of turn outs, stations and yards, turntables, signals, and interlocking, level-crossing. Construction and maintenance of permanent ways : Superelevation, creep of rail, ruling gradient, track resistance, tractive effort, relaying of track.

Highway Engineering : Principles of highway planning, Highway alignments. Geometrical design : Cross section, camber, superelevation, horizontal and vertical curves. Classification of roads : low cost roads, flexible pavements, rigid pavements. Design of pavements and their construction, evaluation of pavement failure and strengthening.

Drainage of roads : Surface and sub-surface drainage.

Traffic Engineering : Forecasting techniques, origin and destination survey, highway capacity. Channelised and unchannelised intersections, rotary design elements, markings, sign, signals, street lighting; Traffic surveys. Principle of highway financing.

Part-C

Hydrology, Water Resources and Engineering :

Hydrology : Hydrological cycle, precipitation, evaporation, transpiration, depression storage, infiltration, overland flow, hydrograph, flood frequency analysis, flood estimation, flood routing through a reservoir, channel flow routing-Muskingam method.

Ground water flow : Specific yield, storage coefficient, coefficient of permeability, confined and unconfined aquifers, aquifers, aquitards, radial flow into a well under confined and unconfined conditions, tube wells, pumping and recuperation tests, ground water potential.

Water Resources Engineering : Ground and surface water resource, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation, economics of water resources projects.

Irrigation Engineering : Water requirements of crops : consumptive use, quality of water for irrigation, duty and delta, irrigation methods and their efficiencies.

Canals : Distribution systems for canal irrigation, canal capacity, canal losses, alignment of main and distributory canals, most efficient section, lined canals, their design, regime theory, critical shear stress, bed load, local and suspended load transport, cost analysis of lined and unlined canals, drainage behind lining.

Water logging : causes and control, drainage system design, salinity and its control.

Canal structures : Design of cross regulators, head regulators, canal falls, aqueducts, metering flumes and canal outlets.

Diversion head work : Principles and design of weirs on permeable and impermeable foundation, Khosla's theory, Principles of operation of Energy Dissipators, stilling basin, silt excluders.

Storage works : Types of dams, design, principles of rigid gravity and earth dams, stability analysis, foundation treatment, joints and galleries, control of seepage.

Spillways : Spillway types, crest gates, energy dissipation.

River training : Objectives of river training, methods of river training.

Part D

Environmental Engineering

Water Supply : Estimation of surface and subsurface water resources, predicting demand for water, impurities of water and their significance, physical, chemical and bacteriological analysis, waterborne diseases, standards for potable water.

Intake of water : Types of Intakes, pumping and gravity schemes. Water treatment : principles of coagulation, flocculation and sedimentation, slow-, rapid-, pressure-, filters; chlorination, softening, removal of taste, odour and salinity.

Water storage and distribution : storage and balancing reservoirs : types, location and capacity. Distribution system : layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations.

Sewerage systems : Domestic and industrial wastes, storm sewage-separate and combined systems, flow through sewers, design of sewers, sewer appurtenances, manholes, inlets, junctions, siphon. Plumbing in buildings.

Sewage characterisation : BOD, COD, solids, dissolved oxygen, nitrogen and TOC. Standards of disposal in normal water course and on land.

Sewage treatment : Working principles, units, grit chambers, sedimentation tanks, trickling filters, oxidation ponds, activated sludge process, septic tank, disposal of sludge, recycling of waste water.

Solid waste : collection and disposal in rural and urban contexts, management of long-term ill-effects.

Environmental pollution : Sustainable development. Radioactive wastes and disposal. Environmental impact assessment for thermal power plants, mines, river valley projects. Air pollution. Pollution control Methods.

COMMERCE & ACCOUNTANCY

Paper-I - Accounting & Finance

Part I - Accounting, Taxation & Auditing

Unit – I - Financial Accounting

Accounting as a financial information system; Impact of International Accounting Standards (e.g., Accounting for Depreciation, Inventories, Gratuity, Research and Development Costs, Construction Contracts, Revenue Recognition, Fixed Assets, Contingencies, Foreign Exchange Transactions, Investments and Government Grants); Problems of Company Accounts relating to Amalgamation, Absorption and Reconstruction of companies and Valuation of Shares and Goodwill.

Unit – II - Cost Accounting

Nature and Functions of Cost Accounting; Job Costing, Process Costing.

Marginal Costing; Techniques of segregating semi-variable costs into Fixed and variable costs.

Cost-volume-profit interrelationship; Aid to decision making including pricing decisions, shutdown etc.

Techniques of Cost Control and Cost Reduction; Budgetary control, Flexible Budgets, Standard Costing and Variance Analysis, Responsibility Accounting, Investment, Profit and Cost centres.

Unit – III - Taxation

Definitions; Basis of Charge; Incomes which do not form part of Total Income.

Simple problems of Computation of income under various heads, i.e., Salaries, Income from House Property, Profits and Gains from Business or Profession, Capital Gains, Income of Other persons included in Assessee's Total Income.

Aggregation of income and Set off/Carry Forward of Loss.

Deductions to be made in Computing Total Income.

Unit – IV - Auditing

Audit of Cash Transactions, Expenses, Incomes, Purchases and Sales.

Valuation and Verification of Assets with special reference to Fixed Assets, Stocks and Debts.

Verification of Liabilities.

Audit of limited companies: Appointment, Removal, Powers, Duties and Liabilities of Company Auditors, Significance of true and fair, MAOCARO report (Manufacturing and Other Companies Audit Report Orders).

Auditor's report and qualifications therein.

Special points in the audit of different organisations like Clubs, Hospitals, Colleges and Charitable Societies.

Part-II - Business Finance and Financial Institutions.

Unit - V - Financial Analysis and Management of working capital.

Finance Function-Nature, Scope and Objectives of Financial Management-Risk and Return relationship.

Financial Analysis as a Diagnostic Tool.

Management of Working Capital and its Components-Forecasting Working Capital needs, Inventory, Debtors, Cash and Credit Management.

Unit - VI - Investment Decisions and Cost of Capital.

Investment Decisions-Nature and Scope of Capital Budgeting-Various types of decisions including Make or Buy and Lease or Buy. Techniques of Appraisal and their applications.

Consideration of Risk and Uncertainty. Analysis of Nonfinancial Aspects.

Rate of Return on Investments-Required Rate of Return-its measurement-Cost of Capital-Weighted Average Cost-Different Weights.

Unit – VII : Capital Structure and Valuation of Firms and Securities.

Capital Structure-Leverages-Significance of Leverages-Theories of Capital Structure with special reference to Modigliani and Miller Approach. Planning the Capital Structure of a Company; EBIT-EPS Analysis; Cash flow ability to service debt; Capital Structure Ratios; Other methods.

Concepts of Valuation-Valuation of firms-Fixed Income Securities and Corporate Bonds.

Dividend and Retention Policy-Residual Theory of Dividend Policy; Other Models-Actual Practices.

Unit – VIII – Raising of Finance and Financial Markets.

Raising Finance-short term and long term. Bank Finance-norms and conditions.

Financial Distress-Approaching BIFR under Sick Industrial Undertakings Act – Concept of Sickness, Potential Sickness, Cash Loss, Erosion of Net worth.

Money Markets-the purpose of Money Markets, Money Market in India-Organisation and working of Capital markets in India. Organisation, Structure and Role of Financial Institutions in India. Banks and Investing Institutions; National and International Financial Institutions-their forms and types of financial assistance. Inter bank lending/call money operations; supervision and control. System of Consortium Finance. Supervision and regulation of Banks.

Monetary and Credit policy of Reserve Bank of India.

Paper-III - Organisation Theory and Industrial Relations

Part-I - Organisation Theory

Unit – I - Nature and Concept of Organisation.

Organisation goals, Primary and Secondary goals, Single and Multiple goals, End-means chain-displacement, succession, expansion and multiplication of goals. Formal organisation: Type, Structure-Line and Staff, Functional, Matrix. Informal Organisation-Functions and limitations.

Unit – II - Organization Theory.

Evolution of Organization theory.

Classical, Neo classical and System approach-Bureaucracy. Nature and basis of power, Sources of Power, Power Structure and Politics

Unit – III - Organization Behaviour

Organizational behavior as a dynamic system: Technical, Social and Power systems-interrelations and interactions-Perception-Status system. Theoretical and Empirical foundation of theories and Models of Motivation, Morale and Productivity Leadership : Theories and Styles

Unit – IV – Conflict Management.

Management of Conflicts in Organization-Transactional Analysis. Man/Nature of Culture in Organizations. Levels of Rationality. Organizational Change, Adaptation, Growth and Development. Professional Management Vs. Family Management, Organizational Control and Effectiveness.

Part-II - Industrial Relations.

Unit – V- Concept of Industrial Relations.

Nature and Scope of Industrial Relations, the Socio-Economic set-up, Need for positive approach – Industrial Relation in India.

Workers' Participation in Management: Philosophy, Rationale, Present day state of affairs and Future prospects

Unit - VI – Manpower Planning.

Role of Personnel Department in Recruitment, Selection, Training and Development, Performance Appraisal.

Unit – VII - Absenteeism and Labour Turnover.

Meaning of absenteeism and Causes of absenteeism in Indian Industries, Labour Turnover – Concepts, Causes and Costs, Methods of control Big Labour Turnover.

Unit – VIII - Salary and Wage Administration.

Determination of Wage Policy, Methods of Remuneration, Methods of incentive schemes, Bonus, wage differentials, Employee Stock Option Schemes(ESOPs), Sweat Equity, Essential features of a good Remuneration and Reward or Scheme.

ECONOMICS

Paper-I

1. Types of Markets and price determination. Criteria for Welfare improvement. Micro and Macro theories of distribution.

2. Full employment and Says' Law-underemployment equilibrium-Keynes' Theory of employment and income determination-Criticism of Keynesian Theory.

3. Functions of money-Measurement of price level changes-the Quantity theory of money, its variants and critiques; the demand for and supply of money-The money multiplier. Theories of determination of interest rate. Theories of inflation and control of inflation.

4. The modern monetary system: Structure of Money and financial markets and commercial Banks, non-bank financial intermediaries, Merchant Banks, and Central Bank. Money market instruments, bills and bonds. Goals and instruments of monetary management in closed and open economies. Relation between the Central Bank and the Treasury. Proposal for ceiling on growth rate of money.

5. Public finance and its role in market economy - allocative efficiency, stabilization, distribution and development. Sources of revenue-Forms of Taxes and subsidies, their incidence and effects. Limits to taxation, loans, crowding-out effects, and limits to borrowing. Types of budget deficits-Public expenditure and its effects.

6. International Economics

(i) Old and New theories of International Trade.

a) Comparative advantage, Terms of trade and offer Curve.

b) Product cycle and Strategic trade theories.

(ii) (a) Trade as an engine of growth.

(b) Forms of protection.

(c) Balance of Payments Adjustments: Alternative Approaches.

a) Price versus income, income adjustments under fixed exchange rates.

b) Theories of policy mix.

c) Exchange rate adjustments under capital mobility.

d) Floating Rates and their implications for developing countries.

(iii) (a) IMF and the World Bank.

(b) W.T.O.

(c) Trade Blocks and monetary unions.

7. Growth and Development

(i) Theories of growth : Classical and neo-classical theories. The Harrod model; economic development under surplus Labour; wage goods as a constraint on growth; relative importance of physical and human capitals in growth; interactions and development; Productivity, its growth and source of changes thereof; Factors determining savings to income ratio and the capital-output ratio.

(ii) Main features of growth : Changes in factors compositions of income; Changes in occupational distribution; changes in income distribution; changes in savings and investment and its pattern of investment. Case for and against industrialisation. Significance of agriculture in developing countries.

(iii) Relation between trade, planning and growth. Changing roles of market and plans in growth; economic policy and growth.

(iv) Role of foreign capital and technology in growth. The significance of infrastructure.

(v) Welfare indicators and measures of growth-Human development indices.The basic needs approach.

(vi) Concepts of sustainable development; convergence of basics of the age of development and developing countries; meaning of self-reliance in growth and development.

Paper-II

I. Indian Economy in Pre-Independence Era-Contributions of Vakil, Gadgil and Rao. National and per-capita income. Patterns, Trends, Aggregate and sectoral composition and changes therein. Broad factors determining National Income and its distribution. Measures of poverty. Trends in India poverty-facts or projections.

II. Employment : Factors determining employment in short and long periods. Role of capital, wage goods, wage-rate and technology. Measures of unemployment. Relation between income, poverty and employment, and issues of distribution and social justice.

Agriculture-Institutional set-up of land system, size of land holdings and efficiency. Green Revolution and technological changes-Agricultural prices and terms of trade-Role of public distribution and farm-activities in agricultural prices and production. Employment and poverty in agriculture-Rural wages employment schemes, growth, supervision-land reforms. Regional disparities in agricultural growth. Role of Agriculture in export.

III. Industry: Industrial system of India: Trends in Composition and growth; Role of public and private sectors; Role of small and cottage industries. Indian Industrial Strategy: Capital versus consumer goods, wage-goods versus luxuries, capital-intensive versus labour-intensive techniques. Sickness and high-cost industrial policies and their effects. Recent moves for liberalisation and their effects on Indian industry.

IV. Money and banking: The monetary institutions of India. Sources of reserve money. Techniques of money supply regulation under open economy. Functioning of money market in India. Budget deficit and money supply. Issues in Reforms of Monetary and Banking System.

V. India's experience of price levels–Causes of Price level in post-Independence period and causes of inflation–role of monetary and supply factors in price level determination–policies towards control of inflation. Effects of inflation under open economy.

VI. Trade, balance of payments and exchange: Foreign trade of India; composition and direction shifts in trade policy from import substitution to export promotion. Impact of liberalisation on pattern of trade. India's external borrowings and Debt problems. Exchange rate of the rupee; Devaluation, depreciation and their effects on balance of payments; convertibility on current and capital accounts; issues in an open economy; Integration of Indian economy with world economy. India and the WTO.

VII. Public Finance and Fiscal Policy: Composition of and trends in India's Public Revenue and Expenditure. Role of Taxes (direct and indirect) and subsidies. Plan and non-plan expenditures and their significance. Public Finance and Inflation. Debt trap and Banking Developments. Recent Fiscal policies and their effects.

VIII. Economic Planning in India: Strategies for Growth and social justice; Planning and sustaining the growth rate; Trends in Savings and Investment. Trends in Savings to Income and capital-output, ratio, Productivity, Employment growth and trends; growth versus distribution. Transition from Central Planning to Indicative planning; relation between Market and Plan.

EDUCATION

PAPER – I

Principles of Education and Human Development

(Part-A)

Unit I Concept of Education :-

Education – meaning, nature, scope & process with reference to Eastern and Western thoughts.

Education as social process.

Aims of Education (individual and Social) with reference to Eastern and Western views. Objectives of Education at different stages from Elementary to Higher Education. Formal, Non-formal & Informal.

Education and its agencies.

Education for Training in cognitive, affective and Psychomotor domains.

Education in Ancient India – The concepts of Dharma, Artha, Karma & Moksha.

Education and its features in the Vedic system- Buddist system & Islamic system with reference to the concept aims, process and significance.

Unit – II Philosophical foundations of Education

Contributions of Idealism, Naturalism, Realism, Pragmatism to the present educational system, education plan, curriculum.

Contributions of Gandhi, Tagore, Aurobindo, Vivekananda, Froebel, Herbart to the field of Education.

Contributions of Pandit Utkalmani Gopabandhu Dash and Kabibar Radhanath Ray to the development of Education in Odisha.

Unit – III Sociological Foundations of Education

Meaning and nature of Educational Sociology.

Relationship of Sociology and Education.

Education as social sub-system – specific characteristics.

Education and the home.

Education and the community with special reference to Indian society.

Education and modernization.

Education and politics.

Education and religion.

Education and culture

Education and democracy

Socialization of the child

Meaning and nature of social change

Education as related to social stratification and social mobility

Education as related to social equity and equality of educational opportunities

Constraints on social change in India (Caste, ethnicity, class, language, religion, regionalism)

Education of the socially and economically disadvantaged sections of the society with special reference to Scheduled Castes and Scheduled Tribes, women and rural population.

Unit - IV Development of Modern Indian Education

Development of Indian Education - During pre independence and Post independence period.

Recommendation of Macaulay's Minutes (1835), Woods Despatch, Sargent Plan, Hartog Committee, Calcutta University Commission, Radhakrishnan Commission.

Secondary Education Commission (1952-53)

Indian Education Commission (1964-66)

National Education Policy (1968)

National Policy on Education 1986 and Programme of Action, 1992

(Part-B)

Unit - V Growth and Development

Concept of Growth, Development and Maturation

Principles of Development, Factors affecting Development, Dimensions of Development : Physical, emotional, mental, social & moral.

Problems of adolescents.

Psychology of adult learner.

Personality - Concept and development, Type and Trait theory, Psychodynamic Approach, Humanistic Approach, Indigenous ideas of self and consciousness : Annamaya, Pranmaya, Manomaya, Vigyanmaya, Anandmaya, Kosa, Atman

Defence mechanism : stress, Frustration, conflict, coping with conflict

Unit - VI Teaching Learning Process

Learning : Concept and process

Theories of Learning: Conditioning and cognitive theories with special reference to Thorndike's connectionism, Skinner's operant conditioning. Contributions of Gagne, Ausubel, Bloom, Piaget, Bruner to learning process. Constructivism in Education.

Transfer of Learning, Theories of Transfer

Motivation - Theories, Techniques of motivating the learners with special reference to Need Hierarchy Theory (Maslow) and Achievement Motivation (McClelland)

Unit - VII Higher Mental or Cognitive abilities :

Intelligence : Concept, meaning and measurement of intelligence, Specific reference to I.Q., Model of Intellect (Guilford), Triarchic Theory (Sternberg), Multiple Intelligences (Gardner), Emotional Intelligence (E.I.), Spiritual Intelligence (S.I.)

Creativity : It's nature & process, Characteristics of a creative person, Measurement of creativity, Fostering creativity. Thinking, Problem solving, Reasoning, Imagination.

Unit - VIII Evaluation in Education

Evaluation – concept, types: Placement, Formative, Diagnostic, Summative

Continuous and comprehensive evaluation.

Recent Trends in Evaluation – Grading, Reporting Evaluation results and its interpretation.

Semester system and Question Bank

Measures of Central Tendencies – Mean, median and mode

Measures of variability – range, average deviation quartile deviation & standard deviation.

Standard scores – 'Z' score, 'T' score, 'Stanine' & percentile scores.

Normal probability curve: meaning, properties and uses in interpreting test results.

Monitoring system for programmes. Evaluation at different levels of Education.

PAPER - II

TRENDS AND ISSUES IN EDUCATION

Section - A

Unit - I Administration, Management & Supervision (Theories)

Concept of Administration & Supervision

Educational Management - functions & Roles of Management, Interpersonal, Informational, Decision-Making, Conflict Management, Act. Analysis, Work Motivation

Administrative Structure of Education in the State and Centre.

Structure and Functions of UGC/NAAC, AIU, AICTE, NCTE, CSSW, IGNOU, CABE, NCERT, NIEPA, CBSE,

SCERT, SIET, CCFL, SRC for A.E. BSC, CBSE

School Complex, School Improvement Planning and Instructional Planning and Management.

Odisha Examination Act, 1981

Equality of Educational Opportunities, Universalisation of Elementary Education

DPEP, Sarva Siksha Abhiyan, VEM.

Finance Management in Education at - Primary, Secondary, Higher, Adult & Non-formal and Technical Education.

Grant in Aid system, Role of Central, State and Local bodies in Education Finance. Cost Analysis of Educational Expenditure.

Unit - II Issues in Education

Value and Peace Oriented Education - Meaning, Needs, Objectives, & programmes

Population Education, Adolescent Education

Adult and Non-Formal Education- Need, Functions and Strategies

Vocationalisation of Education - Need, importance and programmes.

Distance and Continuing Education - Need, importance and functions

Education for All

Work-experience, Socially Useful Productive work

Environmental Education - need, causes of pollution & preventive measures

Health, Nutrition & School Hygiene

Unit – III Education of Children with Special Needs

Identification of Children with special needs

Education for Mentally challenged, Visually impaired, Hearing impaired, and Orthopedically Handicapped children – Characteristics, degree of impairment, Learning disability, Educational programmes, Segregation vs Inclusion

Education of Gifted and Creative children – Characteristics and Educational programmes

Education for socially and economically disadvantaged children of the society with reference to S.C., S.T., Women and Rural population

Role of Teachers in the Education of Children with special needs

Unit – IV Instructional Technology

Meaning and Scope of Educational Technology

Educational Technology as a systems approach to education and its characteristics

Components of Educational Technology – Software and Hardware

Multi-Media Approach in Educational Technology

Designing Instructional Strategies-Lecture, Team-teaching, Illustration, Panel Discussion, Seminars, Symposia and Tutorials

Communication process-Concept, Communication, principles, models and barriers

Programmed learning, Micro-teaching, Broadcast Teaching

(Part – B)

Unit – V Education & National Development

Education & Modernization

Education and Culture

Education and Religion

Education for National Integration and International Understanding

Education for Human Resource Development

Education related to social stratification and social mobility

Unit – VI Teacher Education

Objectives, need specificity of Teacher Education

Strategies for Teacher Education – Pre service, In service programmes

Staff development programmes – Orientation course, refresher course

Summer school – Linking the programmes to content advancement

Teacher as a role model,

Teaching as a profession – professional ethics

Role of Teachers Organisation for development of Primary & Secondary Education and professional development of teachers

Unit – VII National System of Education

National policy on Education 1986 & Programme of Action 1992 – Main observation of Education envisaged in the policy

Salient features as proposed in NCF for various stages

Objectives of Vocational Education,

Nature of system of Education – need, objective structure & curriculum

Concept of ensuring Minimum Learning Outcomes, measures for achieving Minimum Learning Outcomes in each subject area.

Unit – VIII Information Communication Technology (ICT) –

Concept of computer and uses

Software, Hardware and its application

Operating system, and application software

Preparation & Delivery of Lessons Lectures, by using Computer – Collection, Preparation, presentation, evaluation, reporting.

Use of Internet (WWW) in professional development – Collection & processing of information, presentation, reporting and evaluation.

ELECTRICAL ENGINEERING

Paper-I

Electrical Circuits Theory and Applications

Circuit components, network graphs, KCL, KVL, circuit analysis methods : nodal analysis, mesh analysis; basic network theorems and applications, transient analysis ; RL, RC and RLC circuits, sinusoidal steady state analysis, resonant circuits and applications, coupled circuits and applications, balanced 3 phase circuits, Two-port networks, driving point and transfer functions, poles and zeros of network functions, Synthesis of networks synthesis, Filter theory : design and applications, Active filters, Circuit simulation : Input formats, mathematical modelling, solution of equations, output formats, SPICE.

Signals & Systems

Representation of continuous-time and discrete-time signals, LTI systems: convolution, impulse response, time-domain analysis of LTI systems based on convolution and differential/difference equations, Fourier transforms, Laplace transforms, Z transforms, transfer functions, Sampling and recovery of signals, DFT, FFT, Processing of analog signals through discrete time systems.

E.M. Theory

Maxwell's equations, wave propagation in bounded media, Boundary conditions, reflection and refraction of plane waves, Transmission line : Distributed parameter circuits, Smithing and matching waves, impedance matching, Smith chart, Waveguides : parallel plane guide, TE, TM and TEM waves, rectangular and cylindrical wave guides, resonators, Planar transmission lines, striplines, microstrip lines.

Analog Electronics

Characteristics and equivalent circuits (large and small-signal) of Diode, BJT, JFET and MOSFET, Diode circuits : clipping, clamping, rectifier, Biasing and bias stability, FET amplifiers, Current mirror, Amplifiers : single and multi-stage, differential, cascode, feedback and power, Analysis of amplifiers, frequency response of amplifiers, OP-AMP circuits, Filters, sinusoidal oscillators : criterion for oscillation, single-transistor and OP-AMP configurations for oscillators, Function generators and wave-shaping circuits, Power supplies.

Digital Electronics

Boolean algebra; minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinational circuits : arithmetic circuits, code converters, multiplexers and decoders. Sequential circuits : latches and flip-flops, counters and shift-registers. Comparators, timers, multivibrators. Sample and hold circuits, ADCs and DACs. Semiconductor memories. Programmable logic controllers.

Energy Conversion

Principles of electromechanical energy conversion : Torque and emf in rotating machines. DC machines : characteristics and performance analysis; starting and speed control of motors. Transformers : principles of operation and analysis; regulation, efficiency; 3-phase transformers. 3-phase induction machines : Characteristics, speed control. 3-phase synchronous machines : Characteristics, parallel operation. Reactive power control. Special machines : stepper motors, brushless dc motors, permanent magnet motors single-phase motors; Universal Motors.

Power Electronics and Electric Drives :

Semiconductor power devices : diode, transistor, thyristor, triac, GTO, MOSFET and IGBT; static characteristics and principles of operation; triggering circuits; bridge converters : fully-controlled and half-controlled; principles of choppers and inverters; basic concepts of speed control of dc and ac motor drives, applications of variable speed drives.

Analog Communication

Random variables : continuous, discrete; probability, probability functions. Statistical averages; probability models; Random signals and noise : white noise, noise equivalent bandwidth; signal transmission with noise; signal to noise ratio. Linear CW modulation : Amplitude modulation : DSB, DSB-SC and SSB. Modulators and Demodulators; Phase and Frequency modulation : PM & FM signals; narrowband FM; generation & detection of FM and PM, Deemphasis, Preemphasis. CW modulation system : Superheterodyne receivers, AM receivers, communication receivers, FM receivers, phase locked loop, SSB receiver; Signal to noise ratio calculation for AM and FM receivers.

Microwaves and Antenna

Electromagnetic radiation, Propagation of waves : ground waves, sky wave, space wave, tropospheric scatter propagation. Extraterrestrial communications. Antenna : Various types, gain, resistance, bandwidth, beamwidth and polarization, effect of ground. Antenna coupling; high frequency antennas; microwave antennas; special purpose antennas. Microwave Services : Klystron, magnetron, TWT, gunn diodes, Impatt, Bipolar and FETs. Microwave integrated circuits. Microwave measurements.

Paper-II

Control Systems

Elements of control systems, block diagram representation, open-loop & closed-loop systems, principles and applications of feedback. LTI systems : transformation and frequency-domain analysis. Stability : Routh-Hurwitz criterion, root-locus, Nyquist's criterion, Bode-plots. Design of analog compensators. Proportional, PI, PID controllers. State-variable method and application. Principles of discrete control systems.

Electrical Engineering Materials

Electrical/electronic behaviour of materials : conductivity, free-electron and band theory, intrinsic and extrinsic semiconductor, pn junction, superconductivity. Dielectric behaviour of materials, polarization phenomena, piezoelectric phenomena. Magnetic materials : behaviour and applications. Photonic materials : refractive index, absorption and emission of light, optical fibres, lasers and opto-electronic materials.

Microprocessors and interfacing

8-bit microprocessor : architecture, CPU, module design, memory interfacing, I/O. Peripheral controllers/applications. IBM PC architecture : overview, introduction to DOS, Advanced microprocessors.

Measurement and Instrumentation

Error analysis, measurement of current, voltage, power, energy, power factor, resistance, inductance, capacitance and frequency. Electronic measuring instruments : multimeter, CRO, digital voltmeter, frequency counter, Q-meter, spectrum analyzer, distortion-meter. Transducers : thermocouples, thermistor, LVDT, strain-gauge, piezoelectric crystal. Use of transducers in measurement of non-electrical quantities. Data acquisition systems.

IC Technology

Overview of IC Technology. Unit steps used in IC fabrication : wafer cleaning, photo-lithography, wet and dry etching, oxidation, diffusion, ion-implantation, CVD and EPC N Deposition techniques for deposition of poly-silicon, silicon dioxide and silicon nitride, metallization and passivation.

Power System : Analysis and Control

Steady-state performance of overhead transmission lines and cables: principles of active and reactive power transfer, Distribution system, Per unit quantities, Bus admittance and impedance matrices, load flow, numerical computation, Symmetrical components, analysis of symmetrical and unsymmetrical faults, Concept of system stability : swing curves and equal area criterion, Flexible AC Transmission Systems (FACTS), Computer control and Automation : Introduction to energy control centres, various tasks of a power system, SCADA systems and RTUs.

Power system protection

Principles of over current, differential and distance protection, Coverage of solid state relays, Circuit breakers, Load frequency control, Reactive power control, Line loss, generator, transformer protection, numeric relays and application of DSP to protection, Computer aided protection.

Non-conventional Energy Sources and Energy Management

Introduction to the energy problem, difficulties with conventional energy sources, Wind Energy : Basics of Wind turbine aerodynamics, wind energy conversion systems and their integration into electrical grid, Solar Energy : Thermal conversion : photovoltaic conversion, Power storage, Importance of Energy Management : Energy audit, energy economics : discount rate, payback period, internal rate of return, life cycle costing.

Digital Communication

Pulse code modulation (PCM), differential pulse code modulation (DPCM), delta modulation (DM), Digital modulation and demodulation techniques : amplitude, phase and frequency keying schemes (ASK, PSK, FSK), Error control coding : error detection and correction, linear block codes, convolution codes, Information measure and source coding, Data networks, Layer architecture.

Satellite Communication, Radar and TV

Satellite Communication: General overview and technical characteristics, earth station equipment, satellite link design, CNR of Satellite system, Radar : Basic principles, Pulsed systems, CW Doppler radar, FMCW radar, Phase array radars, Television Systems : Television systems and standards, Black-and White and Colour TV, interactive and multimedia systems.

Fibre Optic System

Multiplexing : Time division multiplexing, Frequency Division multiplexing, Optical properties of materials : Refractive index, absorption and emission of light, optical Fibres, Lasers and optoelectronics materials, Fibre optic links.

FISHERY SCIENCE

PAPER-I

Section-A

1. General Fisheries: Role of fisheries and aquaculture in Indian economy and human health. Fisheries resources of India. Utilization of different aquatic resources for fish production. Geographical distribution of fishes in India. Fisheries education and research in India. Organizational setups in fisheries development at national and international context. Frontier research and global scenario in fisheries and aquaculture. Growth and development of fisheries and aquaculture during different plan periods in India. Fisheries and Aquaculture Regulatory Acts. Disaster awareness related to fisheries and aqua culture.

2. Fishery Biology and Resource Management :

2. 1. **Systematics:** Classification and taxonomical characteristics of commercially important freshwater, brackish water and marine fishes of India: Lamniformes, Rajiformes, Torpediniformes, Cypriniformes, Siluriformes, Mugiliformes, Clupeiformes, Anguilliformes, Perciformes (Family-Mugilidae, Centropomidae, Serranidae, Lutjanidae, Sillaginidae, Carangidae, Gerridae, Leiognathidae, Sciaenidae, Polynemidae, Gobiidae, Synodontidae, Scombridae, Stromateidae, Thunnidae, Cichlidae, Nemipteridae, Trichiuridae, Anabantidae, Scorpaenidae) and shellfishes of Order Anostraca, Notostraca, Diplostraca, Podocopa, Cladocera, Calanoida, Harpacticoida, Cyclopoida, Caligoida, Thoracica, Amphipoda, Stomatopoda, Isopoda, Decapoda, Natantia, Reptantia, Macrura, Anomura, Scaphopoda, Polyplacophora, Gastropoda, Cephalopoda, Pectinidae, Pteriomorphia, Pinctadidae, Ostreidae, Mytilidae.

2.2 Anatomy and physiology: Anatomy and physiology of cartilaginous fish (elasmobranchs), bony fishes (Carps, Murrels, Catfish, Seabass, and mullets), finfishes (prawn, shrimp, crab, squids, cuttlefish, lamellibranchs, mussels) with particular reference to their skeletal, digestive, circulatory, respiratory, excretory, reproductive and nervous systems. Osmoregulation and migration. Feeding and breeding habits of commercially important finfishes and shellfishes. Age and Growth-growth curve, absolute and relative growth, isogonic and heterogonic growth, Walford growth transformation.

2.3. Reproductive Biology and Endocrinology: Sex ratio, Age and size at maturity, maturity stages, gonadosomatic index, fecundity, development of gametes, ultrastructural structure of sperm and ovum, types of eggs, spawning and developmental biology of commercially important finfishes and shellfishes (catfish, prawn, crabs and crayfish). Natural breeding, fecundity, parental care, and mechanism of hatching. Modes of reproduction, secondary sexual characters and courtship process. Endocrine glands: Pituitary, thyroid, interrenal, corpuscles of stannius, chromaffin, gonads. hypothalamo-hypophysial complex. X and Y organ.

2.4. Fisheries Resources: Marine and Inland capture fishery resources of India. Catch statistics, conservation. Fisheries of major riverine systems, estuaries, reservoirs and lakes of India. Cold water fisheries of India. Potential marine fishery resources of the Exclusive Economic Zone of India. Major exploited marine fisheries of India. Conservation and management of marine fishery resources; Socioeconomic issues. Definition of population dynamics. Catch per unit effort, Catchability coefficient, Mortality characteristics of Total, Natural & Fishing, Recruitment. Concepts of maximum sustainable yield and maximum economic yield. Application remote sensing in fisheries. Potential fishing zones. Estimation of total catch based on catch and effort data. Single species and multiple species methods of stock assessment; Population models. Marking and tagging techniques. Fisheries regulations (Net regulation, mesh regulation, closed seasons, catch quota regulation etc.)

3. Biochemistry and Microbiology

3.1. Biochemistry: Cell. Structure and function of biomolecules – Amino acids and peptides, Enzymes, Vitamins, Carbohydrates, Protein, Lipid. Metabolism of carbohydrates- ATP cycles, Glycolysis, Citric Acid cycles, Electron Transport, Oxidative phosphorylation. Oxidation of fatty acids and Amino acids. Biosynthesis of carbohydrates, lipid, Amino acids and nucleotides. DNA structure, Replication and transcription. Protein synthesis. Genetic recombination; C fixing, buffers, Normal solutions. Estimation of Protein Lipid, Carbohydrates, Minerals, Essential Amino. Volatile base nitrogen, Total Nitrogen, Non protein nitrogen, Peroxide value, free fatty acid, Thio barbituric acid value. Spectrophotometry, Chromatography, Electrophoresis, Immuno chemical assay.

3.2. Microbiology: Scope and history of microbiology. Microscopes and microscopy. Optical and electron, staining techniques, wet mount and hanging drop preparations. Prokaryotic and eukaryotic cells. Morphology, ultra structure, motility, growth and reproduction of bacteria, virus, fungi and algae. Control of microorganisms-physical and chemical agents, antibiotics and chemotherapeutics. Bacteriological media. Cultivation and cultural characteristics of bacteria. Biochemical, serological and molecular tests for identification of bacteria. Host-microbe interaction-process of infections. Immunity-natural and acquired, immunoglobulins – non-specific and specific. Microorganisms in nutrient cycles-Nitrogen, Sulphur, Phosphorus, Carbon dioxide, Oxygen, Iron and Manganese.

Section-II

4. Aquatic Environment

4.1 Inland: Inland water ecosystems. Biological communities, phytoplankton, zooplankton, benthos, algae and macrophytes. Productivity, food chain, food web and nutrient cycles. Classification and distribution of lakes, ponds, streams, reservoirs, estuaries, mangroves and flood plains. Wet lands, their physico-chemical and biological characteristics in relation to fisheries and aquaculture.

4.2. Marine: Divisions of marine environment. Topographic features of continents. Major groups of phytoplankton and zooplankton, their geographical and seasonal variation. Physical properties of seawater—temperature, salinity, density, colour, light penetration. Oceanic phenomenon—waves, tides and currents. Major currents of Indian Ocean, El Nino, Tsunami and their effects. Biological communities in rocky, sandy and muddy shores. Boring and fouling organisms. Coral reefs. Oceanographic equipments.

4.3. Aquatic pollution: Organic, inorganic and radioactive pollutants in water bodies and their effects. Bioaccumulation and biomagnification. Sewage treatment and effluent management.

5. Social Sciences

5.1 Economics: Definition, scope and role of fishery economics. Economics of fish farming, hatcheries, fishing and processing units. Financial agencies. Project planning, formulation, monitoring and evaluation. Growth and development of fisheries and aquaculture during different plan periods. Fish marketing—marine and inland fish marketing channels in India. Export marketing of fish and fishery products. Marketing management and marketing research. Cooperatives—principles and objectives; structure and function of fishermen cooperatives in India. Problems and remedial measures for growth of fisheries cooperatives.

5.2 Extension: Concepts, principles, scope and objectives of fisheries extension. Extension machineries in fisheries development of India. Extension teaching methods—classification, relative effectiveness of methods, factors affecting choice and use of methods. Extension administration. Organizational structure of fisheries extension. Role of FFDA, BFDA, NATP, ATMA etc. for development of fisheries and aquaculture. Extension programme planning. Participation of organisations and involvement of people in planning. Socio-economic conditions of fisherfolk of India. National and International extension agencies.

5.3 Fisheries administration and legislation: Organizational set up in fisheries and aquaculture regulatory programmes. Laws of the sea. Exclusive Economic Zone, Integrated Coastal Zone Management. Indian Fisheries Act-1897. Marine Fisheries Regulatory Acts of different maritime states of India. State Reservoir Fishery Policy of Odisha. Fisheries related land reforms. Odisha Fisheries Act.

5.4 Fishery Statistics: Sampling methods—random, stratified, cluster. Measures of central tendency—mean, mode, median, probability. Concept of theoretical distributions—binomial, poisson, normal and their fitting to fisheries data. Statistical errors, standard deviation and standard error. Testing of hypothesis—t-test, z-test, chi-square, F-test, nonparametric tests. Correlation—linear and multiple. Regression. Design of experiments.

PAPER II

Section-A

1. Aquaculture

1.1. Principles of Aquaculture: Definition and scope. History of aquaculture and present global scenario.

1.2. Infrastructure: Survey, soil quality in different regions suitable for fish culture, site selection, design and construction of fish farms, hatcheries and raceways. Design and setting of aquaria for ornamental fishes.

1.3. Aquatic environment management: Soil and water management; Physicochemical and biological factors. Biodiversity and control of unwanted fishes, insects and weeds present in fish ponds. Nutrient management. Bioremediation. Biofertilizers. Carrying capacity. Sustainability.

1.4. Types of culture: Extensive, semi-intensive and intensive culture; Cage, pen, recirculatory, running water, waste water, sewage-fed culture. Candidate species for aquaculture (freshwater, brackish water and mariculture) - Carps (Indian Major Carps, Exotic Carps), air breathing fishes, murrels, trouts, tilapia, mullets, milkfish, groupers, freshwater prawns, shrimps, crabs, lobsters, mussels, clams, oysters, cuttlefish and sea weeds. Monoculture and Composite fish culture. Agricultural crop and live stock integration in aquaculture practices. Ornamental fish culture and pearl culture.

1.5 Fish nutrition: Culture of fish food organisms. Feeding habits and nutritional requirements of cultivable shellfishes and finfishes; Digestion, assimilation and conversion of food. Nutritional bioenergetics of fish. Fish feed technology: Feed ingredients, probiotics, essential amino acids. Feed processing and feed dispersal. Anti-nutritional factors, Stress elements.

1.6. Seed production and hatchery management: Seed production and hatchery management of Indian major carps, exotic carps, air breathing fishes, mahseer, trouts, tilapia, mullets, milkfish, groupers, fresh water prawns, shrimps and crabs. Brood stock management of fishes and prawns. Hypophysation technique and synthetic agents and their principle in inducing breeding. Chinese circular hatchery and other hatcheries. Breeding and larva rearing. Shipping. Breeding and seed production of common ornamental fishes.

1.7. Genetics and Biotechnology: Gene and gene action, Gynogenesis, androgenesis, polyploidy, transgenic fish, sex reversal, selective breeding, hybridization, NBL. Cryopreservation of gametes. Genetic characterization (fingerprinting, RAPD, PCR, karyotype).

1.8 Fish health management: Health management in aquaculture; Disease development process; Defence mechanism in fish and shellfish; Parasitic diseases (protozoa, platyhelminthes, aquatic helminthes, acanthocephala, crustacea, leeches, molluscs); Common bacterial, fungal and viral diseases of carp, ornamental fish, fresh water prawn and brackish water shrimp; Clinical signs and symptom, treatment and prophylaxis. Nutritional and environmental diseases of fish and shellfish and their management. Use of disinfectants, chemicals and/or drugs, immunostimulants, vaccines and immunomodulators in aquaculture. Quarantine, and health monitoring. Principles of fish disease diagnosis for epidemic and endemic diseases.

Section B

2 Harvest and Post Harvest Technology

2.1. Fishing Crafts and Gears: Classification of fishing crafts; Dimensions and design of boats; Safety and stability of fishing boats. Care and maintenance of boats; Fishing accessories and deck equipments; Types of marine engines; Fishing methods of India. Modern commercial fishing methods - trawling, purse seining, gill netting and long lining. Classification of gears; yarn numbering; construction and types of twine and ropes; Natural and synthetic material for fishing gears and choice of net materials. Design and fabrication of fishing gears; floats, sinkers, anchors and buoys. Care and preservation of fishing gears.

2.2. Biochemistry of fish: Fish muscle chemistry; Proximate composition of fish; Fish as a source of essential amino acids, n-3 fatty acids, vitamins and minerals. Post mortem changes: rigor mortis, autolysis, microbial putrefaction, lipid autoxidation. Fresh fish spoilage.

2.3. Freezing: Methods of fish preservation; Handling and transportation of fresh fish. Methods of chilling: icing, refrigerated sea water and chilled sea water storage of fresh fish. Principles of low temperature preservation of fish - Freezing and cold storage of finfish and shellfish; Types of freezers - air blast, contact plate, cryogenic and immersion freezing; Refrigeration systems; Cold storage warehousing and cold chain. Changes associated with frozen fishery products - protein denaturation, lipid oxidation, dehydration, drip loss, and their control. Methods of thawing.

2.4. Canning and packaging technology: Types of canning: Conventional, high temperature short time, ultra high temperature; Containers used in canning. Steps in canning: raw material, preparatory treatments, precooking, packing, filling, exhausting, seaming, thermal processing, cooling and storage. Canning of finfish (sardine, mackerel, tuna, seer fish, prawn, crabs, clams and shrimps) in different filling media. Principles of thermal processing: heat resistance of microorganisms, D-value, and Z-value; heat penetration; graphical method of process calculation; F-value. Can defects and spoilage. Packaging materials used for fishery products.

2.5 Cured, Value-added products and by-products: Cured fish: dried, salted, smoked fish, fermented fishery products. Value added fishery products: Breaded and battered products, fish finger, fish cutlet, fish wafer, fish soup powder, fish burger, imitation products, paste products (fish sausage, ham), surimi products, fish pickle. Fishery by-products: fish meal, fish silage, fish oil, fish protein concentrate, shark fin rays, chitin, chitosan, glucosamine hydrochloride, fish maws, fish glue, pearl essence, isinglass, beche-de-mer, fish peptones, collagen, agar-agar, alginic acid, carrageenan, spirulina.

2.6. Quality Control: Biochemical, microbiological and organoleptic indices of fresh fish; Spoilage microflora associated with fish and fishery products. Food poisoning organisms in fishery products: Salmonella, Clostridium, Staphylococcus, Vibrio, Listeria, Aspergillus and marine algae. Fish quality control – Quality assurance; Quality management; Hazard Analysis Critical Control Points (HACCP); ISO-9000 series. Bureau of Indian Standards (BIS) and International Standards (IS) for fish and fishery products; Quality specifications for export of Indian fishery products to European Union, USA and Japan.

FORESTRY

PAPER – I

PART – "A"

1. **Effect of Locality Factors** : Climatic factors : Light, temperature, frost, precipitation, dew, humidity, wind. Physiographic factors : altitude, aspect, topography, microclimate, geology and soil, geology and climatic soil conditions, Biotic factors.

2. **Forest classification and Distribution** : Basis for classification, criteria for delineating forest types in India and Odisha, distribution of forest types, botanical zones : Principal sub-groups, forest types and their distribution : brief description of groups and types, Biodiversity and its preservation, Mangrove forests.

3. **Forest Regeneration** : Natural regeneration : by vegetative parts, by seeds, ecological requirements for natural regeneration, operations to be carried out for natural regeneration : natural regeneration practices for important species and types: moist sal forest, teak forest, bamboo forest, dry deciduous forest, moist deciduous forest, evergreen forest. Artificial regeneration : factors affecting, choice between artificial and natural regeneration, choice of species, choice between sowing and planting, introduction of exotics, procedure for artificial regeneration, seed collection and storage, nursery operation, planting out, maintenance of plantation, Role of tissue culture in regeneration.

4. **Tending operations and Forest growth** : Weeding, cleaning, thinning, thinning types, methods of thinning, factors affecting thinning, thinning in important species, thinning in irregular crops, mixed plantations and coppice crops. Improvement felling, girdling, pruning, Climber cutting. Tree growth: height growth, growth in diameter, increment, growth in quality, rate of growth, crop growth.

5. **Silviculture of Tree species** : Definition, objects of study, relation of silviculture with forestry and its branches. Silviculture of important tree species such as *Acacia auriculiformis*, *Acacia nilotica*, *Leucaena leucocephala*, *Sesbania grandiflora*, *Casuarina equisetifolia*, *Eucalyptus* spp., *Swietenia macrophylla*, *Shorea robusta*, *Tectona grandis*, *Dalbergia sissoo*, *Gmelina arborea*, *Adina cordifolia*, *Melia azedarach*, *Bambusa arundinacea*, *Dendrocalamus strictus*, *Terminalia* species, *Albizia lebbek*, *Samanea saman*, *Lagerstroemia flos-reginae*, *Michelia champaca*.

PART – "B"

6. **Forest Management system** : Systems of forest management: Clear felling system, Uniform and irregular system, Selection system, Coppice system: Single coppice and Coppice with Standard system and Coppice with reserve system. Choice of silvicultural system: systems of management in important forest types, working plan preparation and monitoring.

7. **Production forestry** : Site productivity, productivity of Indian forests, components of production forestry, evaluation of industrial and commercial demands, management of natural forests for production objectives, plantation of industrial and commercial wood, captive plantations, socio-industrial plantation. Involvement of corporate sector in plantation forestry.

8. **Rotation and yield** : Rotation, types of rotation: physical, silvicultural, technical, rotation of maximum volume production, rotation of important species : teak, sal, gamhar, wood grass, casuarina, eucalyptus, wattle and bamboo, etc.; factors reducing rotation age. Yield, yield regulation, yield from Indian forests, concept of sustained yield: principle, scope and limitation.

9. **Forest protection** : Forest degradation : illicit fellings and encroachment, grazing and lopping, forest fires, shifting cultivation, diversion of forest lands. Microbial and fungi, plant diseases, insects pests, plant parasites and aggressive weeds. Protective measures-control of illicit felling and encroachments, control of grazing and lopping, protection from animals, protection against fires, protection against diseases, protection against insect pests, weed control measures.

10. **Forest Influences** : Forest and climate - precipitation, temperature, windbreak and windbreak effect, humidity, frost, snow fall, evapotranspiration ; Forest and soil : organic matter and recycling of nutrients, soil composition and structure, soil temperature, soil moisture, forest and water table, chemical property of soil, biological properties; Forest and hydrological cycle : Forest and interception, forest and infiltration, forest and runoff, forest and erosion, forest and flood, forest and water yield, forest and avalanche; forest and animals; forest and biodiversity conservation, forest recreation, forest and population. Plant succession : stages of succession, climax formation. Watershed management and watershed development. Carbon sequestration by forest plants; Green house effect, Global warming.

PAPER – II

PART – "A"

1. **Forest Development in India** : Five Comprehensive Forest Development in Five-year Plan periods, Land use (forest area, forest cover of the country and the State in particular

Environmental conservation : Importance and principles of conservation, Impact of deforestation due to various anthropic activities like mining, construction and developmental projects, Forest fire

2. **Forest policy and legislation** : Indian Forest Policy of 1894, 1952 and 1988, National Commission on Agriculture 1976 Report on Forestry, constitution of Wasteland Development Council, Indian Council of Forestry Research and Education, Forest laws, necessity and general principles in Indian Forest Act, 1927, Forest Conservation Act, 1980, Wildlife (Protection) Act, 1972, Odisha Forest Act, 1952, Odisha Timber and Other Forest Produce Transit Rules, 1980, Odisha Forest (Grazing of Cattle) Rules, 1980

3. **Forest Economics** : Fundamental Principles of forest economics, estimation of demand and supply, assessment and production of market structures, role of corporate Planning, socio-economic analysis and attributes of forest productivity

4. **Wildlife management** : Common game animals and birds, wildlife conservation and management, wildlife management principles, National parks and wildlife sanctuaries, project tiger

5. **Extension Forestry** : Agroforestry : concepts, classification, scope and management, Agroforestry systems under different agroecological zones, selection of species and roles of multipurpose trees and Non-wood Forest products, Food, fodder and fuelwood security, Research and extension needs, Rain forestry, social forestry – objectives, scope and benefits, Joint forest management, Tribology

PART - "B"

6. **Forest Genetics and Tree Improvement :** Tree Improvement, its peculiarity compared to normal crop breeding, objectives, reasons and kinds of variability, provenances, seed source and selection, principles and methods of tree breeding, vegetative propagation (cuttage & layage), progeny testing, seed production areas, seed orchards (clonal and seedlings) and their management, hybridization, polyploidy and mutation breeding. Importance of genetic resources conservation and preservation of biodiversity.

7. **Forest Mensuration :** Methods of measuring diameter, girth, height and volume of trees, form factor, Volume estimation of stand, sampling methods, yield calculation, current annual increment, mean annual increment, sample plots, yield and yield tables, scope and objectives of forest inventory, Aerial survey and remote sensing techniques.

8. **Forest surveying & Engineering :** Different methods of surveying, Leveling, importance of maps in forestry, maps and map reading, Basic principles of forest engineering, building materials and construction, Roads: objects, classification, geometric principles and considerations, Bridges: Objects, geometric principles, types, simple design and construction of timber bridges.

9. **Wood and its utilization :** Wood anatomy of conifers and hardwoods, wood physics and mechanical properties, Defects of wood, logging and wood extraction, Seasons of seasoning wood, Production of composite and improved wood, wood based industries, Uses of natural wood and processed wood.

10. **Non-wood forest products :** Definition and scope, gums, resins, oleoresins, fibres, flosses, essential oil yielding plants, tannin dye, oilseeds, tars, canes, bamboos, bidi leaves, medicinal plants, apiary, sericulture, lac and cudbear. Collection, processing and disposal of non-wood forest products.

GEOGRAPHY

Paper-I
Principles of Geography

Section-A

Physical Geography

i) Geomorphology : Origin of the earth, Physical conditions of the earth's interior, continental drift, isostasy, plate tectonics, mountain building, volcanism and earthquakes, weathering and erosion, Concepts of gamorphic cycles (Davis and Penck), Landforms associated with fluvial, arid, glacial, coastal and karst region, Polycyclic landforms.

ii) Climatology : Temperature and pressure belts of the world, heat budget of the earth, atmospheric circulation, planetary and local winds, monsoons and jet streams, air masses and fronts, temperate and tropical cyclones, types and distribution of precipitation, Koppen's and Thornthwaite's classification of world climate, hydrological cycle, climatic change.

iii) Oceanography : Bottom topography of the Atlantic, Indian and Pacific Oceans, temperature and salinity of the oceans, ocean deposits, ocean currents and tides, marine resources and their utilization, Coral reefs.

iv) Biogeography : Genesis of soils, classification and distribution of soils, soil profile, soil erosion and conservation, factors influencing world distribution of plants and animals, problems of deforestation and conservation, mangrove vegetation, social forestry, agroforestry.

v) Environmental Geography : Concept and types of environment, Environmental degradation and management, Ecosystems and their management, Energy flows and Biogeochemical cycles, Global ecological crisis/disasters-problems of pollution, global warming, reduction in bio-diversity and degradation of forests.

Section II

Human Geography

i) **Perspectives in Human Geography** : Areal differentiation; regional synthesis; dichotomy and dualism; environmentalism; quantitative revolution and locational analysis; radical, behavioural, humanistic and welfare approaches. Cultural regions of the world. Human development indicators.

ii) **Economic Geography** : World economic development–measurement and problems; world resources and their distribution; energy crisis; the limits to growth; World agriculture–typology of agricultural regions; Von-Thunen's theory of agricultural location; World industries–locational patterns and locational theories of Weber, Hoover, Losch and Smith; Patterns of world trade.

iii) **Population Geography** : Growth and distribution of world population; demographic attributes; causes and consequences of migration; concepts of over-, under- and optimum population; world population problems; Races of man listed.

iv) **Settlement Geography**

Types and patterns of rural settlements; hierarchy of urban settlements; Christaller's Central Place Theory; concept of primate city and rank-size rule; functional classification of towns; sphere of urban influence; rural-urban fringe; satellite towns; problems of urbanization.

v) **Regional Planning** : Concept of region; types of regions and methods of regionalization; growth centres and growth poles; regional imbalances; multi-level planning; planning for sustainable development; Rostow Model of Stages of Growth.

Note : Candidates will be required to answer one compulsory map question pertinent to subjects covered by this paper.

Paper II
Geography of India with special reference to Odisha

Section A

i) **Physical Aspects** : Structure and relief, drainage system and watersheds, physiographic regions, mechanism of Indian monsoons, tropical cyclones and western disturbances; floods and droughts; climatic regions, natural vegetation, soil types and their distributions.

ii) **Resources** : Concept and types of resources, land, water, energy, minerals, and biotic resources, their distribution, utilization and conservation, energy crisis.

iii) **Agriculture** : Infrastructure-irrigation, seeds, fertilizers, power; Types of crops: agricultural productivity, agricultural intensity, crop combination, land capability; agro and social forestry; Green Revolution – its socio-economic and ecological implications; significance of dry farming; Livestock resources and White Revolution; Blue Revolution; agricultural regionalisation; agro-climatic zones.

iv) **Industry** : History of industrial development; locational factors of cotton, jute, iron and steel, fertilizer and paper industries, industrial complexes and industrial regionalization; new industrial policy; role of multinationals, liberalization and globalisation.

v) **Transport, Communication and Trade** : Road, railway, waterway, airway and pipeline networks and their complementary roles in regional development, growing importance of ports on national and foreign trade, trade balance, free trade and export promotion zones; developments in communication technology and its impact on economy and society.

Section B

i) **Cultural Setting** : Racial and ethnic diversities, major tribes, tribal areas and their problems, role of language, religion and tradition in the formation of cultural regions, growth, distribution and density of population; demographic attributes-sex-ratio, age structure, literacy rate, work-force, dependency ratio and longevity; migration (inter-regional, intra-regional and international) and associated problems, population problems and policies.

ii) **Settlements** : Types, patterns and morphology of rural settlements; urban development; Census definition of urban areas; morphology of Indian cities; functional classification of Indian cities; conurbations and metropolitan regions; urban sprawl; slums and associated problems; town planning; problems of urbanization.

iii) **Regional Development and Planning**: Experience of regional planning in India; Five Year Plans; integrated rural development programmes; Panchayati Raj and decentralized planning; command area development; watershed management; planning for backward area, desert, drought-prone, hill and tribal area development; multi-level planning; geography and regional planning.

iv) Political Aspects : Geographical basis of Indian federalism, state reorganisation, regional consciousness and national integration; international boundary of India and related issues; disputes on sharing of water resources, limits and geopolitics of the Indian Ocean.

v) Contemporary Issues : Geo-economic hazards-landslides, earthquakes, Tsunami, cyclones, floods and droughts, epidemics, issues related to environmental pollution, changes in patterns of land use, principles of environmental impact assessment and environmental management, population explosion and food security, environmental degradation; Disasters in India and their management; Problems of agrarian and industrial sectors, regional disparities in economic development, concept of sustainable growth and development.

Note : Candidates will be required to answer one compulsory map question pertinent to the topics covered by this paper.

GEOLOGY

Paper-I
Section-A

(i) General Geology and Geotectonics

The Solar System, Meteorites, Origin and interior of the earth. Radioactivity and age of earth. Volcanoes – causes and products, volcanic belts. Earthquakes-causes, effects, earthquake belts, Seismicity of India, intensity and magnitude, seismograms and seismographs.

Island arcs, Mid-oceanic ridges, Continental drift. Seafloor spreading. Plate tectonics. Orogeny and epeirogeny.

(ii) Geomorphology and Remote Sensing

Basic concepts of geomorphology. Weathering and mass wasting. Landforms, slopes and drainage. Geomorphic cycles and their interpretation. Morphology and its relation to structures and lithology. Applications of geomorphology in mineral prospecting, civil engineering, hydrology and environmental studies. Geomorphology of Indian subcontinent.

Aerial photographs and their interpretation – merits and limitations. The Electromagnetic Spectrum. Orbiting Satellites and sensor systems. Indian remote sensing satellites. Satellites data products. Applications of remote sensing in geology. The Geographic Information system and its applications.

(iii) Structural geology

Principles of geologic mapping and map reading. Study of Toposheets. Stress and strain ellipsoid and stress-strain relationships of elastic, plastic and viscous materials. Behaviour of minerals and rocks under deformation conditions. Folds and faults classification and mechanics. Foliation, lineation, joints and unconformities. Superposed deformation. Primary sedimentary structures and their applications. Introduction to petrofabrics.

Section-B

(iv) Paleontology

Species- definition and nomenclature. Megafossils and Microfossils. Modes of preservation of fossils. Different kinds of microfossils. Application of microfossils in correlation, Petroleum exploration, paleoclimatic and paleoceanographic studies. Morphology, geological history and evolutionary trend in Cephalopoda, Trilobita, Brachiopoda, Echinoidea and Anthozoa. Stratigraphic utility of Ammonoidea, Trilobita and Graptoloidea. Evolutionary trend in Hominidae, Equidae and Proboscidae. Siwalik fauna. Gondwana flora and its importance.

(v) Stratigraphy and Geology of India

Standard Stratigraphic Time Scale. Principles of stratigraphic correlation. Code of stratigraphic nomenclature. Distribution and classification of Precambrian rocks of India. Study of Phanerozoic rocks of India with reference to lithology, fauna, flora and economic importance. Major boundary problems – Cambrian/Precambrian, Cretaceous/Tertiary. Physiographic and Tectonic division of India. Evolution of the Himalayas. Geology of Odisha.

(vi) Hydrogeology and Engineering Geology

Hydrologic cycle. Vertical distribution of subsurface water. Aquifer, Aquitard, Aquiclude and Aquifuge. Classification of Aquifers. Hydrologic properties of water bearing formation – Porosity, Permeability, Transmissivity and Storage Coefficient. Ground water provinces of India. Ground water exploration. Quality of Ground Water. Salt water intrusion. Problems and management of ground water. Ground water recharge. Rain water harvesting.

Engineering properties of rocks. Geological investigations for dams, tunnels and bridges. Building stone and road materials – properties and Indian distribution. Landslides-causes, prevention and rehabilitation. Earthquake resistant structures.

Paper-II
Section-A

(i) Mineralogy

Classification of crystals into systems and classes. International system of crystallographic notation. Spherical and Stereographic Projection. X-ray crystallography. Twinning.

Petrological microscope and accessories. Double refraction. Nicol prism. Optical properties of minerals – Pleochroism, Refractive index, Extinction and extinction angle. Interference colour. Dispersion.

Classification of silicate structures. Structure, chemistry, Physical and optical characters of Feldspar, Mica, Pyroxene, Amphibole, Garnet, Olivine and Silica groups. Minerals of Carbonate and sulphide groups.

(ii) Igneous and Metamorphic Petrology

Generation and crystallization of magma. Crystallization of albite-anorthite, diopside-albite-anorthite and diopside-wollastonite-silica systems. Reaction principle. Magmatic differentiation and assimilation. Petrogenetic significance of the textures and structures of igneous rocks. Petrography and petrogenesis of granite, syenite, diorite, basic and ultrabasic rocks, charnockite, anorthosite and alkaline rocks and Carbonatites. Deccan volcanic province.

Types and agents of metamorphism. Metamorphic grades and zones. Protoliths. Facies of regional and contact metamorphism. ACF and AKF diagrams. Textures and structures of metamorphic rocks. Metamorphism of pneumatolitic, argillaceous and basic rocks. Retrograde metamorphism. Metasomatism and granitization. Migmatites. Granulite terrains of India.

(b) Sedimentology

Processes of formation of sedimentary rocks. Textures and structures of sedimentary rocks and their significance. Classification of sedimentary rocks. Binary admixtures and their significances. Sedimentary facies and provenance. Sedimentary environments-fluvial, glacial, lacustrine and marine. Sedimentary basins of India.

Section-B

(a) Economic Geology

Ore minerals and gangue, tenor and grade. Classification of mineral deposits. Process of formation of minerals deposits. Controls of ore localisation. Metallogenic epochs and provinces. Geology of the important Indian deposits of chromium, manganese, copper, gold, iron, lead-zinc, manganese, titanium, uranium and thorium and industrial minerals. Deposits of coal and petroleum in India. National Mineral Policy. Conservation and utilization of mineral resources. Marine mineral resources and Law of Sea.

(c) Mining Geology

Methods of prospecting - geological, geophysical, geochemical and geobotanical. Techniques of sampling. Estimation of reserves of ore. Methods of exploration and mining of metallic ores, industrial minerals and marine mineral resources. Mineral beneficiation and ore dressing.

(c) Geochemistry and Environmental Geology

Cosmic abundance of elements. Geochemical classification of elements. Structure and their composition of earth and distribution of elements. Trace elements. Geochemical cycle. Elementary of crystal chemistry, types of chemical bonds, coordination number, isomorphism and polymorphism.

Natural hazards/floods, landslides, coastal erosion, earthquakes and volcanic activity and their mitigation. Environmental impact of urbanization, open cast mining, industrial and radioactive waste disposal, use of fertilizers, destroying of water sheds and fly ash. Pollution of ground and surface water, marine pollution. Environmental protection legislative measures in India.

HISTORY

Paper I
Section A

1. Sources of early Indian history.

2. Early pastoral and agricultural communities.

3. The Indus Civilization: its origins, nature and decline.

4. Patterns of settlement, economy, social organization and religion in India (c. 2000 to 500 B.C.).

5. Evolution of society and culture evidence of Vedic texts (Samhitas to Sutras).

6. Life & Teachings of Mahavira and Buddha. Contemporary society. Early phase of state formation and urbanisation.

7. Rise of Magadha; the Mauryan empire. Ashoka's inscriptions; his dhamma. Nature of the Mauryan state.

8. Post-Mauryan period in India: Political and administrative history. Society, economy, culture and religion. Tamilakam and its society: the Sangam texts.

9. India in the Gupta and post-Gupta periods (to c. 750): Political history of India. Samanta system and changes in political structure; economy; social structure; culture; religion.

10. Themes in early Indian cultural history: languages and texts; major stages in the evolution of art and architecture; major philosophical thinkers and schools; ideas in science & Technology and mathematics.

11. Kalinga War, Kharavela achievements.

12. Political History of Odisha (4th Century AD – 7th Century AD)

Section B

13. India, 750-1200 : Polity, society and economy. Major dynasties and political structures in North India. Agrarian structures. Feudalism in India. Rise of Rajputs. The Imperial Cholas and their contemporaries in South India. Village communities in the South. Conditions of women. Commerce, mercantile groups and guilds; towns. Problem of coinage. Arab conquest of Sind; the Ghaznavide empire.

14. India, 750-1200: Culture. Literature. Kalhana as a historian. Styles of temple architecture; sculpture. Religious thought and institutions: Sankaracharya's Vedanta. Ramanuja. Growth of Bhakti. Advent of Islam in India. Sufism. Indian science. Alberuni and his study of Indian science and civilization.

15. The 13th Century: The Ghorian invasions; Factors behind Ghorian success; Economic, social and cultural consequences; Foundation of Delhi Sultanate; The "Slave" Dynasty; Iltutmish; Balban; Early Sultanate architecture.

16. The 14th Century: Alauddin Khalji's conquests, agrarian and economic measures; Muhammad Tughluq's major "projects"; Firuz Tughluq's concessions and public works; Decline of the Sultanate; Foreign contacts: Ibn Battuta.

17. Economy Society and Culture in the 13th and 14th centuries: Caste and slavery under Sultanate; Technological changes; Sultanate architecture; Persian literature: Amir Khusrau; Historiography: Ziya-ud-din Barani; Evolution of a composite culture; Sufism in North India; Lingayats; Bhakti schools in the south.

18. The 15th and early 16th Century (Political History): Rise of Provincial Dynasties: Bengal, Kashmir (Zainul Abedin), Gujarat, Malwa, Bahmanids; The Vijayanagra Empire; Lodis; Mughal Empire, First phase : Babur, Humayun; The Sur Empire : Sher Shah's administration; The Portuguese colonial enterprise.

19. The 15th and early 16th Century (society, economy and culture): Regional cultures and literatures; provincial architectural styles; Society, culture, literature and the arts in Vijayanagara Empire; Monotheistic movements: Kabir and Nanak; Bhakti Movements: Chaitanya; Sufism in its pantheistic phase.

20. Akbar: His conquests and consolidation of empire; Establishment of jagir and mansab systems; His Rajput policy; Evolution of religious and social outlook; Theory of Sulh-i-kul and religious policy; Abul Fazl, thinker and historian; Court patronage of art and technology.

21. Mughal empire during 17th & 18th Centuries : Major policies (administrative and religious) of Jahangir, Shahjahan and Aurangzeb; The Empire and the Zamindars; Nature of the Mughal state; Late 17th Century crisis: Revolts; Shivaji and the early Maratha Kingdom; Decline of Mughals; Maratha ascendancy under the Peshwas.

22. Economy and Society, 16th and 17th Centuries: Population, Agricultural and craft production; Towns; Trade and Commerce with Europe through Dutch, English and French companies; Indian mercantile classes; Banking, insurance and credit systems; Conditions of peasants, Artisans; Condition of Women.

23. Culture during Mughal Empire: Persian literature (including historical works); Hindi and religious literatures; Mughal architecture; Mughal Painting; Provincial schools of architecture and painting; Classical music; Science and technology; Sawai Jai Singh as astronomer; Mystic eclecticism : Dara Shukoh; Vaishnav Bhakti; Maharashtra Dharma; Evolution of the Sikh community (Khalsa).

24. Medieval Odisha : The Bhaumakaras and the Somavamsis; The Imperial Gangas and Suryavamsi Gajapatis; Cult of Jagannatha.

Paper-II

Section-A

1. Establishment of British rule in India: Factors behind British success against Indian powers-Mysore, Maratha Confederacy and the Punjab as major powers in resistance; Policy of Subsidiary Alliance and Doctrine of Lapse.

2. Colonial Economy : Drain of wealth and "deindustrialisation"; Fiscal pressures and revenue settlements (Zamindari, Ryotwari and Mahalwari settlements); Structure of the British Raj up to 1857 (including the Acts of 1773 and 1784 and administrative organisation).

3. Resistance to Colonial rule: Causes, nature and impact of the Revolt of 1857; Reorganisation of the Raj, 1858 and after.

4. Socio-cultural impact of colonial rule: Official social reform measures (1828-57); Orientalist-Anglicist controversy; coming of English education and the press; Christian missionary activities; Bengal Renaissance; Social and religious reform movements in Bengal and other areas; Women as focus of social reform.

5. Economy 1858-1914: Railways; Commercialisation of Indian agriculture; Growth of landless labourers and rural indebtedness; Famines; India as market for British industry; Customs removal, exchange and countervailing duties; Limited growth of modern industry.

6. Early Indian Nationalism: Social background; formation of national associations; Peasant and tribal uprisings during the early nationalist era; Foundation of the Indian National Congress; The Moderate phase of the Congress; Growth of Extremism; The Indian Council Act of 1909; Home Rule Movement; The Government of India Act of 1919.

7. Inter-War economy of India: Industries and problem of Protection; Agricultural distress; the Great Depression; Ottawa agreements and Discriminatory Protection; the growth of trade unions; The Kisan Movement; The economic programme of the Congress; Karachi resolution, 1931.

8. Nationalism under Gandhi's leadership: Gandhi's career, thought and methods of mass mobilisation; Rowlatt Satyagraha; Khilafat; Non-Cooperation Movement; Civil Disobedience Movement; 1940 Satyagraha and Quit India Movement; States' Peoples Movement.

9. Other strands of the National Movement:

(a) Revolutionary movements since 1905; (b) Constitutional politics; Swarajists, Liberals, Responsive Cooperation; (c) Ideas of Jawaharlal Nehru; (d) The Left (Socialists and Communists); (e) Subhas Chandra Bose and the Indian National Army; (f) Communal strands: Muslim League and Hindu Mahasabha; (g) Women in the National Movement.

10. Towards Freedom: The Act of 1935; Congress Ministries, 1937-1939; The Pakistan Movement; Post-1945 upsurge (RIN Mutiny, Telangana uprising); Constitutional negotiations and the Transfer of Power, 15 August 1947.

11. First phase of Independence (1947-64): Facing the consequences of Partition; Gandhiji's murder; economic dislocation; Integration of States; The democratic constitution, 1950; Agrarian reforms; Building an industrial welfare state; Planning and industrialisation; Foreign policy of Non-alignment; Relations with neighbours.

12. Odisha under Colonial rule and after: British Conquest of Odisha- Khurda Rebellion (1817)-Kandha Rebellions under Dora Bisoyee and Chakra Bisoyee-[illegible] Movement under Surendra Sai-Odia Movement-Nationalist Movement-Merger of States.

Section-B

13. Enlightenment and Modern ideas

1. Renaissance Background
2. Major Ideas of Enlightenment: Kant, Rousseau
3. Spread of Enlightenment outside Europe
4. Rise of socialist ideas (to Marx)

14. Origins of Modern Politics

1. European States System
2. American Revolution and the Constitution.
3. French revolution and aftermath, 1789-1815.
4. British Democratic Politics, 1815-1850; Parliamentary Reformers, Free Traders, Chartists.

15. Industrialization

1. English Industrial Revolution: Causes and Impact on Society
2. Industrialization in other countries: USA, Germany, Russia, Japan
3. Socialist industrialization: Soviet and Chinese.

16. Nation-State System
1. Rise of Nationalism in 19th century
2. Nationalism - nation-building in Germany and Italy
3. Disintegration of Empires through the emergence of nationalism

17. Imperialism and Colonialism
1. Colonial System (Exploitation of New World, Trans-Atlantic Slave Trade, Tribute from Asian Countries)
2. Types of Empire: of settlement and non-settlement: Latin America, South Africa, Indonesia, Australia.
3. Imperialism and Free Trade: The New Imperialism

18. Revolution and Counter-Revolution
1. 19th Century European revolutions
2. The Russian Revolution of 1917-1921
3. Fascist Counter-Revolution, Italy and Germany.
4. The Chinese Revolution of 1949

19. World Wars
1. 1st and 2nd World Wars as Total Wars: Nature, Implications
2. World War I - Causes and Consequences
3. World War II - Political Consequences

20. Cold War
1. Emergence of Two Blocs
2. Integration of West Europe and US Strategy: Communist East Europe
3. Emergence of Third World and Non-Alignment
4. US and Dispute Resolution

21. Colonial Liberation
1. Latin America-Bolivar
2. Arab World-Egypt
3. Africa, Apartheid to Democracy
4. South-East Asia-Vietnam

22. Decolonization and Underdevelopment
1. Decolonization: Break up of Colonial Empires: British, French, Dutch
2. Factors constraining Development: Latin America, Africa

23. Unification of Europe
1. Post-War Foundations : NATO and European Community
2. Consolidation and Expansion of European Community/European Union

24. Soviet Disintegration and the Unipolar World
1. Factors in the collapse of Soviet communism and the Soviet Union, 1985-1991
2. Political Changes in East Europe 1989-1992
3. End of the Cold War and US Ascendancy in the World
4. Globalization

HOME SCIENCE

PAPER – I

Section A – Food & Nutrition

1. Study of Foods : Importance, Composition, nutritive value of Cereals, Pulses, Vegetables and Fruits, Fatty Foods (Meat, Fish, Poultry, Eggs), Milk & Milk products, Fats and oils.

2. Study of Nutrients : Classification, sources, functions, requirements and deficiencies of Proteins, Fats, Carbohydrates, Minerals, Vitamins, Water and Roughages.

3. Utilization of Food : Digestion, absorption and metabolism of Proteins, Fat and Carbohydrates. Basal metabolism and factors affecting Basal metabolism, methods of measurement of Basal Metabolic Rate (BMR). Total energy requirement and factors affecting requirements.

4. Therapeutic Nutrition : Therapeutic adaption of normal diets, Factors to be considered in planning therapeutic diets, Dietary management in case of Diabetes, Nephritis, Peptic ulcer, Hypertension, Atherosclerosis, Liver Cirrhosis and Jaundice.

5. Food spoilage : Causes of food spoilage and food contamination. Food adulteration and food poisoning, maintaining quality of food, control of food quality (Codex Alimentarius, Bureau of Food as mandated by FSO, FPO, Ag mark, ISI).

6. Malnutrition : Causes and effect of malnutrition on the vulnerable section of the society, effect of malnutrition on national development. Measures to combat malnutrition – Nutrition intervention policy and programmes. Role of ICDS, WHO, UNICEF, NIN, NFI, CFTRI, FTRI, NNMB in combating malnutrition.

Section B - Human Development and Family Studies

1. Basis of Human development : How life begins, role of genetic and environmental factors affecting human development, stages and factors affecting prenatal growth and development.

2. Development of children (0-3 years) : Physical and Motor development, Intellectual development (Piaget's stages of development). Development of emotions.

3. Development of children (4-6 years): Speech development, Social development, Personality development (Role of family, School, Community and Mass Media).

4. Exceptional Children: Meaning, Classification of exceptional children, Management and care of Gifted, Mentally and Physically challenged and Sensory Impaired children.

5. Adolescent Development: Physical and sexual development, Social and Emotional changes, Development of aspiration and achievement, Personality development and family relationships.

6. Family life cycle: Significance, stages and developmental tasks and problems associated with each stage of family life cycle. Contemporary family problems: Marital problems, Financial, Sickness, Accidents, Dowry, Divorce, Old age, Employed Women. Strengthening families through counselling.

PAPER - II

Section A - (i) Family Resource Management

1. Management of family Resources: Time management – Time demand during life cycle, Tools in time management, Leisure time, factors to be considered in making time plan. Energy management – Relation of energy to stages of family life cycle, energy cost of household tasks, work simplification techniques.

2. Money management : Family income, stages of family life cycle and use of money, budgeting, saving and investing the money for future. Supplementing family income.

3. Housing and Interior decoration : Selection of site, house layout, floor plans, space planning with reference to activities, building components and materials. Furnishing : types (furniture, curtains and draperies, wall treatment, floor covering, upholstery, lighting), colouring, [illegible], including [illegible] principles of interior designing followed in furnishing the house.

(iii) Textile and clothing :

4. Textile Fibres : Classification of textile fibres, according to source and chemical composition, manufacturing process, physical, chemical and other properties of Cotton, Wool, Silk, Rayon, Acrylic, Polyester.

5. Fibre to Fabric : Conventional yarn making process, Types of yarns, fabric construction techniques, Weaving, parts of loom, Types of weaves, Fabric finishes (Natural Fibres, Synthetic Fibres) Different dyeing and printing methods.

6. Wardrobe Planning, Colour combination in textile designing, criteria of selection of clothes for different age groups, climatic conditions and occasions for men, women and children.

Section B: Home Science Extension Education

1. Extension Education : Concept, philosophy, objectives and scope of extension education. Role and qualities of extension worker. Need for Home Science Extension Education.

2. Extension Education & Development : Objectives of Home Science Extension Education, Development aspects of extension, Extension as a programme and process, Skills control, financing, planning and characteristics of Extension.

3. Programme planning : Meaning, nature, principles and scope of programme planning, steps of making a programme, characteristics of a good programme planning, programme implementation and evaluation.

4. Communication in Extension : Importance, elements of Communication, Communication process, Communication models, scope and purpose of communication, Communication channels.

5. Community Development : Concept, scope, principles and limitation of Community development and Community Organisation, Subject matter of community development, Community Development programmes – objectives, principles and types of community development programmes, Role of Panchayati Raj, Village Schools, Cooperatives, Mahila mandals, Youth and farmers club, Self Help Groups, Government and non Governmental agencies in Extension programmes.

6. Teaching & Learning in extension : Education, extension teaching methods, classification and selection of appropriate method, factors, advantage and limitations of different methods of teaching (mass, group, individual), Audio-visual aids – planning, selection and types of visual, audio and audio-visual aids, contribution of audio-visual aids in extension teaching.

LAW

Paper I
Section-A

Constitutional Law of India
1. Preamble and nature of Indian Constitution
2. General Ideas on the fundamental rights
3. Right to equality
4. Right to freedom of speech and expression
5. Right to life & personal liberty
6. Right to Constitutional Remedies
7. Directive principles of State Policies and Fundamental Duties
8. Constitutional position of the President and relation with the Council of Ministers
9. Governor and his Powers
10. Appointment and Tenure of Judges of the Supreme Court and the High Court
11. Supreme Court and High Courts: Powers and Jurisdiction
12. Union Public Service Commission and State Public Service Commission: Powers and Functions
13. Distribution of Legislative Powers between the Union and the States
14. Administrative Relationship between Union and the States
15. Emergency Provisions
16. Civil Services: Constitutional Safeguards
17. Parliamentary Privileges
18. Amendment of the Constitution
19. Principles of Natural Justice
20. Judicial Review of Administrative Actions

Section B

International Law

1. Nature and Definition of International Law
   Relationship between International Law and Municipal Law

2. Individuals : Nationality, Statelessness, Human Rights and procedures available for their enforcement

3. State Recognition and State Succession

4. Treaties: Formation, application & termination

5. United Nations: Its principal organs, powers, and functions
   General Assembly & Security Council

6. Concept of Human Rights
   Universal Declaration of Human Rights, 1948

7. International Covenant on Civil and Political Rights, 1966

8. International Covenant on Economic, Social and Cultural Rights, 1966

9. International Commission on Human Rights

10. New international economic order and mandatory law: WTO, TRIPS, GATT, IMF, World Bank.

Paper-II
Section-A

Law of Crimes

1. General Principles of Criminal Liability : mens rea and actus reus, Mens rea in statutory offences

2. Stages of Crime : Preparations and criminal attempts

3. General Exceptions

4. Joint and constructive liability

5. Abetment

6. Criminal conspiracy

7. Offences against the State

8. Offences against public tranquility

9. Offences against human body

10. Offences against property

11. Offences against Women

12. Defamation

13. Prevention of Corruption Act, 1988

Law of Torts :

1. Nature and definition

2. Liability based upon fault & strict liability

3. Vicarious liability: State Liability

4. General defences

5. Joint tortfeasors

6. Negligence

7. Defamation

8. Nuisance

9. Conspiracy

10. False imprisonment

11. Malicious Prosecution

12. Consumer Protection Act, 1986

Section-II

Law of Contracts and Mercantile Law

1. Formation of Contract

2. Factors vitiating consent

3. Void, Voidable, illegal and unenforceable agreements

4. Performance and discharge of contracts

5. Quasi contracts

6. Consequences of breach of contract

7. Contract of Agency

8. Sale of goods and hire purchase

9. Formation and dissolution of partnership

10. Negotiable Instruments Act, 1881

Negotiable Instruments meaning, Promissory Note, Bill of exchange, Cheque, crossing of cheques and Dishonor of cheques.

LITERATURE OF THE FOLLOWING SUBJECTS

Note (i):- In regard to the languages included in the Eighth Schedule to the Constitution, the scripts are given below :-

LANGUAGE		SCRIPT
Gondi	–	Devanagari
Odia	–	Odia
Sanskrit	–	Devanagari
Persian	–	Persian
Urdu	–	Persian

Note (ii):- Candidates should note that the questions are required to be answered in a specific language and not in a mixed medium.

ENGLISH

Objective: The syllabus consists of two papers generally covering the period 1600-2000 in English Literature. It is designed to test the ability of the candidate at first-hand and critical reading of the major texts/authors belonging to the period.

Paper – II

Group A

1. Shakespeare — King Lear — OR — The Tempest
2. Marlowe — Dr Faustus
3. John Webster — *The Duchess of Malfi*
4. John Donne

"The Good Morrow", "Canonization", "Dreame", "A Valediction: Forbidding Mourning", "The Sun Rising", "Death, Be Not Proud".

5. John Milton *Paradise Lost* Bks I, II
6. Alexander Pope — *Rape of the Lock*
7. William Wordsworth

"Daffodils", "Tintern Abbey", "Ode on Intimations of Immortality", "Three Years She Grew", "She Dwelt Among Untrodden Ways", "Upon Westminster Bridge".

Group B

8. Jonathan Swift — *Gulliver's Travels*
9. Jane Austen — *Pride and Prejudice*
10. Charles Dickens — *Hard Times*
11. Thomas Hardy — *Tess of the D'Urbervilles*
12. George Eliot — *The Mill on the Floss*

Paper - III

Group A

1. W.B. Yeats

   "Easter 1916", "The Second Coming", "A Prayer for My Daughter", "Sailing to Byzantium", "Among School Children", "Leda and the Swan", "The Lake Isle of Innisfree"

2.	T.S. Eliot	The Waste Land OR Four Quartets
3.	Indian Poets	
	Kamala Das	"My Grand Mother's House", "The Looking Glass"
	Nissim Ezekiel	"Enterprise", "Night of the Scorpion"
	Jayanta Mahapatra	"The Abandoned House in a Calcutta Street", "Lost"
	R. Parthasarathy	"from Trial", "From Home Coming"
	A.K. Ramanujan	"Love Poem for a Wife I", "A River"
4.	John Osborne	Look Back in Anger
5.	Samuel Beckett	Waiting for Godot
6.	Henrik Ibsen	A Doll's House
7.	August Strindberg	Father

Group B

8.	James Joyce	Portrait of the Artist as a Young Man
9.	E.M. Forster	A Passage to India
10.	Gopinath Mohanty	The Ancestor [illegible] Published by Central Sahitya Academy
11.	Chinua Achebe	Things Fall Apart
12.	V.S. Naipaul	A House for Mr. Biswas

HINDI

Paper-I

Answers must be written in Hindi

Section-A

1. History of Hindi Language and Nagari Lipi.

   I. Evolution of Hindi Language: Apabhransh, Awahatta & Arambhik Hindi.

   II. Development of Braj and Awadhi as literary language during medieval period.

   III. Early form of Khari-boli in Siddha-Nath Sahitya, Khusero, Sant Sahitya, Rahim etc. and Dakhni Hindi.

   IV. Development of Khari-boli and Nagari Lipi during 19th Century.

   V. Standardisation of Hindi Bhasha & Nagari Lipi.

   VI. Development of Hindi as National Language during freedom movement.

   VII. The development of Hindi as a National Language of Union of India.

   VIII. Scientific & Technical development of Hindi Language.

   IX. Development of Hindi as Media Language.

   X. Prominent dialects of Hindi and their interrelationship.

   XI. Salient features of Nagari Lipi and the efforts for its reform & standard form of Hindi.

Section B

I. History of Hindi Literature

i. The relevance and importance of Hindi literature and tradition of writing History of Hindi Literature.

ii. Literary trends of the following four periods of history of Hindi Literature.

- A : Adi kal - Sidh, Nath and Raso Sahitya.
  Prominent poets - Chandvardai, Khusaro, Vidyapati.
- B : Bhaktikal - Sant Kavyadhara, Sufi Kavyadhara, Krishna Bhaktidhara and Ram Bhaktidhara.
  Prominent Poets - Kabir, Jayasi, Sur & Tulsi.
- C : Riti kal - Ritibaddhakavya & Riti Mukta Kavya.
  Prominent Poets - Keshav, Bihari, Padmakar and Ghananand.
- D : Adhunik Kal
  - a. Renaissance, the development of Prose, Bharatendu Mandal.
  - b. Prominent Writers : Bharatendu, Bal Krishna Bhatt & Pratap Narain Mishra.
  - c. Prominent trends of modern Hindi Poetry : Chhayavad, Pragativad, Prayogvad, Nai Kavita, Navgeet and Contemporary poetry and Janvadi Kavita.
    Prominent Poets : Maithili Sharan Gupta, Prasad, Nirala, Mahadevi, Dinkar, Agyeya, Muktibodh, Nagarjun.

III. Katha Sahitya

- A. Upanyas & Realism
- B. The origin and development of Hindi Novels.
- C. Prominent Novelists : Premchand, Jainendra, Yashpal, Renu and Bhism Sahani.
- D. The origin and development of Hindi short story.
- E. Prominent Short Story Writers : Premchand, Prasad, Agyeya, Mohan Rakesh & Mannu Bhandari.

IV. Drama & Theatre

- A. The origin & Development of Hindi Drama.
- B. Prominent Dramatists : Bharatendu, Prasad, Laxmi Narayan Mishra, Ram Kumar Verma, Mohan Rakesh.
- C. The development of Hindi Theatre.

V. Criticism

a) The origin and development of Hindi criticism : Saiddhantik, Vyavaharik, Pragativadi, Manovishleshanvadi & Nai Alochana.

b) Prominent critics : Ramchandra Shukla, Hajari Prasad Dwivedi, Ram Vilas Sharma & Nagendra.

VI. The other forms of Hindi prose - Lalit Nibandh, Rekhachitra, Sansmaran, Yatra-vritant.

Paper II

Answers must be written in Hindi

This paper will require first hand reading of prescribed texts and will test the critical ability of the candidates.

Section A

1.	Kabir :	Kabir Granthawali, Ed. Shyam Sundar Das (First hundred Sakhis)
2.	Surdas :	Bhramargeet Sar, Ed. Ramchandra Shukla (First hundred Padas)
3.	Tulsidas :	Ramcharit Manas (Sunder Kand) Kavitawali (Uttar Kand)
4.	Jayasi :	Padmawat Ed. Shyam Sunder Das (Sinhal Dweep Khand & Nagmativiyog Khand)
5.	Bihari :	Bihari Ratnakar Ed. Jagannath Prasad Ratnakar (First 100 Dohas)
6.	Prasad :	Kamayani (Chinta and Shraddha Sarg)
7.	Nirala :	Rag-Virag, Ed. Ram Vilas Sharma (Ram Ki Shakti Puja & Kukurmutta)
8.	Dinkar :	Kurukshetra
9.	Agyeya :	Angan Ke Par Dwar (Asadhya Veena)
10.	Muktibodh :	Andhere Mein

Section-B

1.	Bharatendu :	Andher Nagari
2.	Mohan Rakesh :	Ashad Ka Ek Din
3.	Ramchandra Shukla :	Chintamani (Part I) (Kavita Kya Hai, Shraddha Aur Bhakti)
4.	Premchand :	Godan, Premchand ki Sarvashreshtha Kahaniyan, Ed. Amrit Rai.
5.	Prasad :	Skandgupta
6.	Yashpal :	Divya
7.	Phanishwar Nath Renu :	Maila Anchal
8.	Mannu Bhandari :	Mahabhoj
9.	Nibandh Nilaya :	Edited by Dr. Satyendra ; Bal Krishna Bhatt, Premchand, Gulab Rai, Hajari Prasad Dwivedi, Ram Vilas Sharma, Agyeya, Kuber Nath Rai.

ODIA

Paper I

Answers must be written in Odia.

Section A

History of Odia Language

(i) Origin and development of Odia Language – Influence of Austric, Dravidian, Perso-Arabic and English on Odia Language.

(ii) Morphology : Morphemes (free, bound and compound), derivational and inflectional affixes.

(iii) Syntax : Kinds of sentences and their transformations, structure of sentences.

(iv) Semantics – Different types of change in meaning. Euphemism.

(v) Common errors in spellings, grammatical uses and construction of sentences.

Section B

History of Odia Literature

(i) Historical backgrounds (social, cultural and political) of Odia Literature of different periods.

(ii) Ancient epics, ornate kavyas and padavalis.

(iii) Typical structural forms of Odia Literature (Koili, Chautisa, Poi, Chaupadi, Champu).

(iv) Impact of romanticism with special reference to poetry, fiction and essay.

Paper-II

Answers must be written in Odia.

Critical Study of Texts :

This paper will require first-hand reading of the text and test the critical ability of the candidates.

Section-A

Poetry

(Ancient)

1. Sarala Das-Gadajuddha from Mahabharata.

2. Jagannath Das-Bhagabata, XI Skandha-Jadu Avadhuta Sambada.

(Medieval)

3. Dinakrushna Das-Rasakallola- (Chhandas 16 & 34)

4. Upendra Bhanja-Lavanyabati (Chhandas 1 & 2)

(Modern)

5. Radhanath Ray-Chilika.

6. Mayadhar Mansingh - [illegible]

7. Sachidananda Routray - Baji rout

8. Ramakanta Ratha-Saptama Ritu.

Section-B

Drama :

9. Manoranjan Das-Klanta Prajapati

10. Bijay Mishra-Tata Niranjana

Novel :

11. Fakir Mohan Senapati-Chhamana Athaguntha

12. Gopinath Mohanty-Danapani

Short Story

1. [illegible]
2. [illegible]

Essay

3. [illegible]
4. [illegible]

PERSIAN

PAPER – I.

There will be two questions which must be answered in Persian. The remaining questions must be answered either in Persian or in the medium of examination opted by the candidate.

SECTION : A

1. (a) Description of the origin and development of Persian language. (To be answered in Persian)

   (b) Applied grammar, Rhetorics, Prosody, Idioms and Phrases frequently used.

   (i) Grammar : Ism and its kinds, Ism-e-Ishara, Mosawwar Elah, Fel and its kinds, Tenses, Gender, Singular and Plural, Zamir and its kinds.

   (ii) Rhetorics : Tajnees, Iham, Muraat Nazeer, Laff-o-Nashr, Husn, Tazmeen, Tashbeeh-o-Aqsam and Talmeeh.

   (iii) Prosody : Bahr-e-Hazaj, Bahr-e-Ramal, Bahr-e-Rajaz, Bahr-e-Mutaqarib, Bahr-e-Kamil. (Only SALIM Bahoor)

SECTION : B

2. Short essay in Persian, 250 words (to be answered in Persian)

3. History of Persian literature in Iran and India : Literary criticism and styles : Trends in classical and modern literature : Socio-cultural influences, development of modern literary genres including drama, novel, short story.

PAPER - II

There will be two compulsory questions one each in critical portions of prose and poetry which are to be answered in Persian. The remaining questions are to be answered either in Persian or in the medium of examination opted by the candidate. This paper will require first hand reading of the texts prescribed and will be designed to test the candidates critical ability.

SECTION - A

PROSE

1. Nizami Aruzi Samarqandi :
   Chahar Maqala
   (i) Dabiri
   (ii) Shairi

2. Kaikaus [illegible] : Qabus Nama
   (i) Dar Shinakhtan-e-Haqq-e-Pidar-o-Madar
   (ii) Dar [illegible]
   (iii) Dar Talab-e-Ilm wa Faqih wa Faqihi

3. Sadi Shirazi : Gulistan
   (i) Dar Tasir-e-Tarbiyat

4. Muhammad Aufi : Jawami-ul-Hikayat
   (i) [illegible] Hikayat

5. Maulana Abdur Rahman Jami : [illegible] : First six Hikayat.

6. Dr. Ghulam Sarwar : [illegible]
   (i) [illegible]
   (ii) [illegible]
   (iii) Sir Syed Ahmad Khan
   (iv) [illegible]
   (v) [illegible]

7. Maulana Shibli Nomani : Sher-ul-Ajam Part I & III

8. [illegible] : [illegible]
   (i) Dar Bayan-e-[illegible]
   (ii) Dar Bayan-e-[illegible]
   (iii) Dar Bayan-e-[illegible]

SECTION-B

POETRY

1. Firdausi : Shahnama
   (i) Rustam-wa-Sohrab

2. Umar Khayyam : Rubaiyat
   (Radif Alif & Ba)

3. Sadi Shirazi : Bostan,
   Hikayat Dar Tadbeer-o-Tarbiyat-wa-Tadbeer Sardar Dar Siyasat.

4. Amir Khusro : Ghazaliyat-e-Khusro
   (Radif Alif)

5. Maulana Rumi : Masnavi Maulana
   (First half of first volume)

6. Hafiz Shirazi : (Radif Alif)

7. Urfi Shirazi – Qasaid
   (i) [illegible]
   (ii) [illegible]

8. Allama Iqbal
   (i) Asrar-e-Khudi

9. Bahar Mashhadi
   (i) Taloo-e-Sulh
   (ii) Dukhtar-e-Bhutto

10. Bhutto – Qasaid (Radif Laam & Meem)

11. Syed Ahmad Kasravi : Pand Nama

NOTE : Italics portions of prose and poetry are to be explained in Persian Compulsorily.

SANSKRIT

Paper I

There will be three questions as indicated in the question paper which must be answered in Sanskrit. The remaining questions must be answered either in Sanskrit or in the medium of examination opted by the candidate.

Section A

1. Significant features of the grammar, with particular stress on the following subjects : (to be answered in Sanskrit)
   - (a) Sanjna – It, Savarna, Ti, Upadha, Samyoga, Vriddhi, Guna, Pratipadika, Samprasarana.
   - (b) Sandhi – Ac, Hal, Visarga
   - (c) Karaka
   - (d) Samasa
   - (e) Vacya – Kartari, Karmani and Bhave (voice usage)

2. Origin and development of Sanskrit language
   - (a) Classification of Indo European languages
   - (b) Main characteristics of Vedic Sanskrit language
   - (c) Prominent features of Classical Sanskrit language
   - (d) Contribution of Sanskrit to linguistic studies

3. General Knowledge of Literary History of Sanskrit and Principal trends of literary criticism:
   - (a) History of Vedic Literature (Samhita, Brahmana, Aranyaka and Upanisads)
   - (b) Ramayana, Mahabharata
   - (c) The origin and development of literary genre of:
     Mahakavya – Asvaghosa, Kalidasa, Bharavi, Magha, Sriharsa, Bhatti,
     Rupaka (drama) – Bhasa, Kalidasa, Bhavabhuti, Harsa,
     Visakhadatta, Sudraka, Bhattanarayana, Murari.

     Katha – Dandin, Subandhu, Bana
     Akhyayika – Bana
     Campu – Nalacampu, Campuramayana
     Khandakavya – Meghaduta and Hamsaduta
     Muktaka Kavya
     Kathasahitya (Tales and Fables) – Brihatkatha, Kathasaritsagara, Pancatantra, Hitopadesa,
     Vetalapancavimsati, Dvatrimsat-puttalika

Section II

4. Essentials of Indian Culture with stress on:

a) Purusarthas

b) Samskaras

c) Varnasramavyavastha

d) Arts and Fine arts

e) Technical sciences

f) Kautilya's Arthasastra, Adhikarana I, Prakarana I, Adhyaya II - Vidyasamuddesah - Anviksiki Sthapana, Prakarana VII, Adhyaya XI - Gudhapurusotpattih.

5. Trends of Indian Philosophy.
General outlines on

a) Samkhya
b) Yoga
c) Nyaya
d) Vaisesika
e) Mimamsa
f) Vedanta
g) Carvaka
h) Jaina
i) Bauddha

6. Short Essay in Sanskrit (within 300 words)

7. Unseen passage with the questions, to be answered in Sanskrit.

Paper-II

Question from Group 3 is to be answered in Sanskrit only. Questions from Groups 1, 2, 4 and 5 are to be answered either in Sanskrit or in the medium opted by the candidate.

Section A

General study of the following groups:

Group 1

a) Raghuvamsam-Kalidasa
b) Kumarasambhavam-Kalidasa
c) Kiratarjuniyam-Bharavi
d) Sisupalavadham-Magha
e) Naisadhiyacaritam-Sriharsa
f) Kadambari-Banabhatta
g) Dasakumaracaritam -Dandin
h) Sivarajyodayam-S.B. Varnekar

Group 2

a) Isavasyopanisad
b) Kathopanisad (Ch. II, Valli Verses 10 to 15)
c) Bhagavadgita
d) Sundarakanda of Valmiki's Ramayana

Group 3

a) Svapnavasavadattam- Bhasa
b) Abhijnanasakuntalam- Kalidasa
c) Mrcchakatikam-Sudraka
d) Mudraraksasam-Visakhadatta
e) Uttararamacaritam- Bhavabhuti
f) Ratnavali-Sriharsavardhana
g) Venisamharam- Bhattanarayana

Group 4

Short notes in Sanskrit on the following:
a) Buddhacaritam – Asvaghosa b) Meghadutam-Kalidasa
c) Nitisatakam-Bhartrhari d) Panchatantram- Visnusarma
e) Rajatarangini-Kalhana f) Harsacaritam-Banabhatta
g) Amarukasatakam-Amaruka h) Gitagovindam-Jayadeva

Group 5

General study of
(a) Sankhyakarika, (b) Tarkasangraha (c) Vedantasara (d) Manusmrti

Section B

Questions from Groups 1 and 2 are to be answered in Sanskrit only. Questions from Groups 3, 4 and 5 are to be answered in Sanskrit or in the medium opted by the candidate.

This Section will require first hand reading of the following prescribed texts :—

Group 1
(a) Raghuvamsam—Canto I, Verses 1 to 10
(b) Kumarasambhavam—Canto I, Verses 1 to 10
(c) Kiratarjuniyam—Canto I, Verses 1 to 10

Group 2
(a) Isavasyopanisad—Verses 1, 2, 4, 6, 7, 15 and 18
(b) Bhagavadgita II chapter verses 13 to 25
(c) Sundarakandam of Valmiki's Ramayana, Canto 15, Verses 15 to 30 (Geeta Press Edition)

Group 3
(a) [illegible] — Canto [illegible] verses)
(b) Meghadutam—Purvamegha verses 1 to 10
(c) Nitisatakam—Verses 1 to 10 (Edited by D.D. Kosambi Bharatiya Vidya Bhavan Publication)
(d) Kadambari—Sukanasopadesa (only)

Group 4
(a) Svapnavasavadattam Act VI
(b) Abhijnanasakuntalam Act IV verses 15 to 30 (M.R. Kale Edition)
(c) Uttararamacaritam Act I verses 31 to [illegible] (M.R. Kale Edition)

Group 5
(a) [illegible]
(b) [illegible]
(c) [illegible]
(d) [illegible]

General Note :— (for both the papers) At least two questions should be answered in Sanskrit selecting one from each section. Devanagari script should be used for answering in Sanskrit.

URDU

Paper II

Answers must be written in Urdu.

Section A

Development of Urdu Language

a) Development of Indo-Aryan (i) Old Indo-Aryan (ii) Middle Indo Aryan (iii) New Indo Aryan

b) Western Hindi and its dialects Braj, Khadi Boli, Haryanvi. Theories about the origin of Urdu Language

c) Dakhni Urdu: Origin and development, its significant linguistic features.

d) Social and Cultural roots of Urdu language and its distinctive features. Script, Phonology, Morphology, Vocabulary.

Section B

a) Genres and their development: (i) Poetry : Ghazal, Masnavi, Qasida, Marsia, Rubai, Jadid Nazm.

(ii) Prose : Dastan, Novel, Short Story, Drama, Inshaiya, Khutut, Biography.

b) Significant features of : (i) Deccani, Delhi and Lucknow schools

(ii) Sir Syed movement, Romantic movement, Progressive movement, Modernism (iii) Development of Urdu prose and poetry in Odisha.

c) Literary Criticism and its development with reference to Hali, Shibli, Kaleemuddin Ahmad, Ehtisham Hussain, Ale Ahmad Suroor.

d) Essay writing (covering literary and imaginative topics)

Paper-II
Answers must be written in Urdu.

This paper will require close hand reading of the texts prescribed and will be designed to test the candidate's critical ability.

Section-A

1.	Mir Anees	-	Taqlid-e-Shahr
2.	Ghalib	-	Intikhab-e-Ghazliyat-e-Ghalib
3.	Sir Syed Ahmad Khan	-	Intikhab-e-Maqalat-e-Sir Syed
4.	Prem Chand	-	Godan
5.	Krishan Chander	-	Aan Data
6.	Abul Kalam Azad	-	Ghubar-e-Khatir

Section-B

1.	Mir	-	Intikhab-e-Kalam-e-Mir (Ed. Abdul Haq)
2.	Mir Hasan	-	Sehr-ul Bayan
3.	Ghalib	-	Dewan-e-Ghalib
4.	Iqbal	-	Bal-e-Jibreel
5.	Faiz	-	Dast-e-Saba
6.	Nun	-	Dasht-e-Sus
7.	Ali Sardar Jafri	-	Pattar-ki Deewar

MANAGEMENT

Paper-I

The candidates should make a study of the concept and development of management as science and art drawing upon the contributions of leading thinkers of management and apply the concepts to the real life of government and business decision making keeping in view the changes in the managerial and operative environment.

Section-A

I. **Managerial Function** : Concept and Evolution of Management, Managerial roles and functions – Planning, Organization, Coordination, Motivation, Staffing, Direction, Control ; Analysis of Environmental opportunities and threats, Formulation of Organizational Vision, Mission and Objectives, Decision Making, Concept of good governance – Indicators of good governance, Role of agencies like Transparency International, Corporate code of conduct.

II. **Organizational Behaviour and Design** : Classical and Neoclassical Systems, Delegation of Authority, Design of Strategic Business Units, Theories of motivation and their relevance : Hierarchy of need model, Factor theory, Systems of motivation, Achievement, Power, Money, Affiliation, Communication : Barriers and gateways, Leadership : characteristics, transformational leader and transactional leader, Leader in change agents Understanding group behaviour and group dynamics, Behaviour in small groups, Conflict Management, Managing Change, Innovation in Organizations : Design such as Networks, Knowledge Based Management Systems and Processes

III. **Quantitative Techniques in Decision Making :** Classification of data, Averages, Dispersion and Skewness, Product moment, Correlation, Rank correlation, Regression, Time Series Analysis & Forecasting, Technicques, Quantitative techniques, Elementary concepts of Binomial, Poisson and Normal Distributions, Tests of Significance 't', 'F' and Chi-square, Linear Programming-Problem formulation, product mix, product construction, warehousing and transportation problems, Simplex method and Graphical solutions, Basic concepts and models of non-linear programming, PERT and CPM, Determination of critical path, Crashing, Decision making under uncertainty

Section-B

IV. **Management Control System :** Basic concepts, Understanding strategic imperatives, Responsibility Centres : cost centres, profit centres, investment centres, Strategic Planning, Preparation of budgets, Zero Based Budget, Analysis and Evaluation of Performance, Control System in Service Organisation, Modern Control Methods, Controlling Global Enterprises, Transfer Pricing - Basis for fixing transfer pricing, Management of Risk.

V. **Strategic Cost Management :** Cost concepts and classification, Cost Analysis, Profit Analysis, Value Chain : Conceptual issues and Applications, Cost analysis Activity based costing, Cost Drivers and their implications, Target Costing, Profit Variance Analysis, Divisional performance vs. Managerial performance

VI. **Business Environment :** Conceptual Analysis of Macro business environment : Indian and global, Analysis of structural dimensions of Indian Economy, Dimensions of change and impact on business decisions, Regulatory and promotional Policies, Liberalization, Globalization and Corporatisation, Problems and Prospects.

Paper-III

Section-A

I. **Financial Management** : Goal of Finance Function; Analysis of Financial Position; Ratio and Funds Flow Analysis; Concepts of value and return; Valuation of Bonds and Shares; Risk and Return: Portfolio Theory; CAPM and APT; Option Pricing; Financial and Operating leverage; Design of Capital Structure: Theories and Practices; Management of Working Capital: Estimation and Financing; Management of Cash, Receivables and Inventory and Current Liabilities; Capital and Money Markets: Institutions and Instruments; Leasing, Hire-purchase and venture capital; mergers and acquisitions; Shareholder Value Creation: Dividend Policy; Corporate financial policy and strategy; Management of corporate distress and restructuring strategy; Regulation of capital market.

II. **Marketing Management** : Concept and strategy; Analysis of marketing environment and planning process; Understanding and selecting target markets; Marketing Research; Consumer Behaviour; Segmentation, Targeting and Positioning; Product management; Distribution channels and logistics; Public Distribution System; Marketing Communication; Brand Management; personal selling and management of salesforce; Pricing decisions; Understanding competitive strategy; Design, implementation and control; Services and non-profit marketing; Social Marketing; Creating global competitive Advantage: Analysis, formulation, implementation and control; Evaluation of marketing function; Ethics in marketing; Consumer protection; E-Business.

III. **International Business** : International Business Environment: Changing composition of trade in goods and services; Emerging areas of trade; Evolution of International Trade Policies-instruments of trade policy, Institutions of international business GATT/WTO; Tariffs and Trips; Labour conditions and environmental issues; trade in services and agri products; role of IMF, World Bank, UNCTAD; Regional Economic Cooperation; Export Marketing Management-Overseas market research; Export pricing and finance; Management of risk; Export-import procedures; Role of intermediaries and documentation.

Section-B

IV. **Operation and Materials Management** : Fundamentals of Operations Management, Organizing for Production, Aggregate Production Planning, Capacity Planning, Plant Design, Process planning, plant size and scale of operations, Management of Breakdown, Equipment replacement and maintenance, Production control, Supply Chain Management, Vendor Evaluation and Audit, Quality Management.

Role and importance of Materials Management , Material Handling, Value Analysis, Quality control, Make or Buy Decision, Classification, Standardization of spare parts, inventory, Inventory Control, Two Bin System, Waste Management, Purchasing process and procedure, International Buying, Business process reengineering, Business process outsourcing.

V. **Management Information System** : Conceptual Foundations of Information System, Information Resource Management, System Development, Overview of Systems and Design, System Development Management, Life cycle, Designing real-time and Distributed environments, Implementation and Control of Project, Trends in Information Technology, Managing Data Resources, Organizing Data, DBA and RDBMS.

VI. **Human Resource Development** : Concept and Policies, Man power planning, recruitment, Selection, Changing, development, promotion and transfer, Performance Measurement, Behavioral norm and and other methods, job evaluation, job enrichment, Compensation Management, Employee Morale and Productivity, Management of Organizational Climate and Industrial Relations, Human Resource Accounting and Audit.

MATHEMATICS

Paper-I

Section – A

1. <u>Abstract Algebra</u> :

   (i) Integers, Congruences.

   (ii) Groups, Subgroups, Normal Subgroups, Permutation groups, Homomorphism, Isomorphism, Counting Principles, Sylow's Theorem, Caley's Theorem.

   (iii) Rings, Integral Domain, Field, Subring, Homomorphism, Ideal, Principal Ideal Ring, Maximal Ideal, Polynomial rings, Unique Factorization Theorem.

2. <u>Linear Algebra</u> :

   (i) Vector space, Linear dependence, Independence, Subspaces, Basis, Dimension, Finite Dimensional Vector space, Linear Transformation, Rank-nullity Theorem.

   (ii) Matrices, Determinants, Inverse, Eigenvalues, Row echelon reduction, Echelon form, Orthogonal, Symmetrical, Skew-symmetrical, Unitary, Hermitian Matrices.

3. <u>Analytic Geometry</u> :

   (i) 2-D Geometry : Straight lines, Pairs of lines, Circle, System of Circles, Conic sections.

   (ii) 3-D Geometry : Planes, Lines, Skew-lines, Sphere, Intersection of Plane and sphere, Cone, Cylinder, Conicoids, Tangent plane to conicoids.

<u>Section – B</u>

1. <u>Real and Complex Analysis</u> :

   (i) Real Analysis : Real number system, Order relations, Bounds, l.u.b., g.l.b., Cauchy sequence, Completeness, Compactness, Continuity, Uniform Continuity of functions, Riemann Theory of Integration, Fundamental Theorem of calculus, Convergence of sequences and series, Uniform convergence.

   (ii) Complex Analysis : Analytic function, Cauchy Riemann Equation, Cauchy Integral Formula, Taylor, Laurent's series, Singularities, Poles, residues, Contour integral.

2. **Calculus :**

(i) Functions of one variable : Limit, Continuity, Differentiability, Mean value theorem, Maxima, Minima.

(ii) Asymptotes and Curvatures : Rectification, Area, Volume and Surface area of revolution (Equations in Cartesian and Parametric forms only).

(iii) Functions of several variables : Limit, Continuity, Differentiability, Jacobians, Euler's theorem.

(iv) Improper integrals : Convergence, Gamma and Beta functions.

(v) Multiple integrals : Double and Triple integrals and their Evaluations.

3. **Vector Analysis :**

(i) Dot and Vector products, Scalar and vector Triple Products.

(ii) Differentiation of Vector functions, Divergence, Gradient, Curl of Vectors (in Cartesian form only).

(iii) Green, Gauss and Stokes theorems and applications.

(iv) Tangent, normal and binormal to curves in space, Serret-Frenet formulae.

Paper – II

Module-A

1. **Numerical Analysis :**

(i) Interpolation : Lagrange, Newton Divided difference forms, Forward and backward interpolation polynomials.

(ii) Approximation : Least squares approximation and curve fitting.

(iii) Numerical solution of nonlinear equations : Bisection, Secant, Newton-Raphson and fixed point iteration techniques.

(iv) Numerical differentiation and integration : Differentiation formulae based on differences, Newton-Cotes rules, Compound rules, Gauss-Legendre 2 and 3 point rules.

(v) Numerical solution of I.V.P. : Euler method, Taylor's method, Runge-Kutta Methods of order two.

2. **Graph Theory :**

Simple graphs, Regular, Complete graphs, Bipartite graphs, Matrix representation of graphs, Connected graphs, Isomorphic graphs, Trees, Planar graph, Hamiltonian and Eulerian graphs, Vertex colouring of graphs and Chromatic number.

1. **Ordinary and Partial Differential equations**
   (i) Linear first order O.D.E.
   (ii) Higher order linear differential equations with constant and variable coefficients.
   (iii) Series solution of O.D.E.
   (iv) Solution of O.D.E. by Laplace transformation techniques.
   (v) Solution of equations $P(x,y)dx + Q(x,y)dy = 0$ and $dy/dx = f(x,y) = c$.
   (vi) Charpits method for partial differential equations.
   (vii) Linear second order P.D.E. and solutions

Section - B

1. **Computer programming**
   (i) Flow charting and algorithms
   (ii) Basics of Fortran language, Arithmetic and logical expressions, Arithmetic and Logical Statements
   (iii) GO TO and Computed GO TO Statements, Arithmetic and Logical IF, IF ... THEN ... ELSE Statements, DO Loops
   (iv) Arrays and subscripted variables
   (v) Functions, Subprograms and Subroutines
   (vi) Programme writing in Fortran

2. **Mechanics and Hydrodynamics**
   (i) Statics : Law of parallelogram of forces, Equilibrium of forces, Couple and Moments, Friction
   (ii) Dynamics : Laws of motion, D' Alembert's principle, Motion of a particle in a plane, Projectiles, Motion of rigid bodies, Moments of Inertia.
   (iii) Hydrodynamics : Equation of continuity, Euler equation of motion (in Cartesian forms), Stream lines, Path Line, Potential flow, Stream Function and Potential functions, Sources, Sinks and Image system with respect to Plane and Circle.

3. **Operations Research :**
   (i) Formulation of L.P.P., Graphical solution
   (ii) Simplex method and Duality
   (iii) Transportation and Assignment problems

MECHANICAL ENGINEERING

Paper I

1. **Theory of Machines :**
Kinematic chain, Mechanisms and inversions. Motor Vehicle steering gears. Hooke's Joint. Toothed gears. Tooth profiles. Interference. Gear Trains. Compound gears. Differential. Cam profiles. Displacement, velocity and acceleration of cam followers. Flywheel and Turning moment diagram. Governors, Stability, Sensitivity, Isochronism and hunting. Governor effort and power. Controlling Force and effect of friction. Balancing of revolving masses. Balancing of single and multicylinder engines. Frictions and Lubrication. Hydrodynamic theory of lubrication. Linear free and forced vibration of single and two degree freedom mechanical systems with or without damping. Critical speeds and whirling of shafts. Vibration of Beams. Torsional vibration.

2. **Mechanics of Solids :**

Stress and strain for materials in tension, compression and shear. Relation between elastic constants for an isotropic, linear elastic and homogeneous materials. Uniaxial Loading. Thermal stresses. Stress-strain diagrams for ductile and brittle materials. Stress and strain in two dimensions. Principal planes, Mohr's circle. Simple torsion. Bending moment and shear force diagrams. Composite beams. Bending stresses. Shear stress distribution. Slope and deflection in beams. Torsion of circular shafts. Helical springs. Combined stresses. Theories of failure. Thick and thin walled pressure vessels. Rotating discs and shrink fit. Struts and columns. Energy principles. Strain energy due to bending, twisting and axial load. Castigliano's theorem. Reciprocal Theorem. Slope and deflection by energy methods.

3. **Engineering Materials :**

Basic concepts on structure of solids. Crystalline materials. Defects in crystalline materials. Alloys and binary phase diagrams, structure and properties of common engineering materials. Iron-carbon equilibrium diagram. TTT diagram. Heat treatment of steels. Plastics, Ceramics and composite Materials, common applications of various materials.

4. **Manufacturing Science :**

Pattern, Gating and risering system, casting defects, special casting process, welding – Gas welding, arc welding, resistance welding, thermit welding. Tool geometry and nomenclature ASA, ORS and NRS, types of chips, cutting variables, Chip reduction coefficient, Merchant's force diagram, velocity relationship and Kronenberg's relationship, Ernst & Merchant angle relationship, Lee-shafer relationship/cutting fluid, Tool wear, Taylor's tool life equation, Economics of metal machining, Jigs and Fixtures.

NC, CNC, ECM, EDM, AJM, USM, LBM, Plasma machining, High energy rate forming.

5. **Manufacturing management :**

Production Planning and Control, Forecasting-Moving average, exponential smoothing, Operations scheduling, assembly line balancing, Product development, Breakeven analysis, Capacity planning, PERT and CPM.

Control Operations : Inventory control-ABC analysis, EOQ model, Materials requirement planning, Job design, Job standards, work measurement, Quality management-Quality control. Operations Research : Linear programming, Graphical and Simplex methods, Transportation and assignment models, Single server queuing model.

Value Engineering : Value analysis, for cost/value, Total quality management and forecasting techniques, Project management.

6. **Elements of computation :**

Computer Organisation, Flow charting, Features of Common Computer Languages-C, FORTRAN, Elements of Basic and elementary programming.

Paper II

1. **Thermodynamics :**

Basic concepts, Open and closed systems, Applications of Thermodynamic Laws, (Zeroth), First and Second Laws, Gas equations, Clapeyron equation, Availability, Irreversibility and Tds relations, reciprocating air compressors.

2 I.C. Engines, Fuels and Combustion

Spark ignition and compression ignition engines, Four stroke engines and Two stroke engines, mechanical, thermal and volumetric efficiency, Heat balance. Combustion process in S.I. and C.I. engines, preignition detonation in S.I. engine Diesel knock in C.I. engine. Choice of engine fuels, Octane and Cetane ratings. Alternate fuels, Carburetion and Fuel injection, Engine emissions and control. Solid, liquid and gaseous fuels, stoichiometric air requirement and excess air factor, fuel gas analysis, higher and lower calorific values and their measurements.

3 Heat Transfer, Refrigeration and Air Conditioning

One and two dimensional heat conduction. Heat transfer from extended surfaces, heat transfer by forced and free convection. Heat exchangers. Fundamentals of diffusive and convective mass transfer, Radiation laws, heat exchange between black and non black surfaces, Network Analysis. Heat pump refrigeration cycles(reversible refrigeration, vapour compression and absorption refrigeration) and systems, Condensers, evaporators and expansion devices and controls. Properties and choice of refrigerant, Refrigeration Systems and components, psychrometrics, comfort indices, cooling load calculations, solar refrigeration.

4. Turbo-Machines and Power Plants

Continuity, Momentum and Energy Equations. Adiabatic and Isentropic flow, Fanno lines, Rayleigh lines. Theory and design of axial flow turbines and compressors, Flow through turbo-machine blades, cascades, centrifugal compressor. Dimensional analysis and modelling. Selection of site for steam, hydro, nuclear and stand-by power plants, Selection base and peak load power plants, Modern High pressure, High duty boilers, Draft and dust removal equipment, Fuel and cooling water systems, heat balance, station and plant heat rates, operation and maintenance of various power plants, preventive maintenance, economics of power generation.

PHILOSOPHY

PAPER – I

Section A

History of Philosophy (Western)

1.	Plato :	Theory of Ideas
2.	Aristotle :	Form, Matter and Causation
3.	Descartes :	Cartesian Method, Certain Knowledge, God, Mind – Body Dualism
4.	Spinoza :	Substance, Attributes, Modes, Pantheism
5.	Leibnitz :	Monads, Pre-established Harmony
6.	Locke :	Theory of Knowledge, Refutation of Innate Ideas, Substance and Qualities
7.	Berkeley :	Immaterialism, God, Criticism of Representative Theory of Perception
8.	Hume :	Theory of Knowledge, Scepticism, Self, Causality
9.	Kant :	Possible Synthesis of Empiricism and Rationalism, Space, Time, Categories, Possibility of Synthetic Apriori Judgements, Ideas of Reason, Antinomies, Criticism of the Proofs for the Existence of God.
10.	Hegel :	Dialectical Method, Absolute Idealism.
11.	Precursors of Linguistic Analysis :	Moore (Defence of Common Sense, Refutation of Idealism), Russell (Theory of Descriptions)
12.	Logical Positivism :	Theory of Verification and Rejection of Metaphysics.
13.	Phenomenology :	Husserl.
14.	Existentialism :	Kierkegaard, Sartre.

Section B

(Indian Philosophy)

1. Carvaka : Theory of Knowledge, Materialism
2. Jainism : Theory of Reality, Syadvadasaptabhangi Nayaya, Bondage and Liberation
3. Buddhism : Pratityasamutpada, Kshanbhanga, Nairatmyavada, Nirvana, Vijnanavada, Sunyavada
4. Nyaya : Theory of Causation, Proofs for, Purusa, Theory of Evolution
5. Nyaya & Vaisesika : Theory of Pramana, Self, Liberation, Proofs for the Existing of God, Categories, Theory of Causation, Atomistic Theory of Creation
6. Mimamsa : Theory of Knowledge and Error
7. Vedanta : Sankara and Ramanuja on Brahman, Atman, Jivatman, Jiva, Jagat, Maya, Moksa

Paper – II

Section A

Socio-Political Philosophy

1. Political Ideals : Equality, Justice, Liberty,
2. Individual and State
3. Democracy : Concept and Forms
4. Socialism and Marxism
5. Fascism
6. Secularism
7. Human Rights
8. Theories of Punishment
9. Communism and Violence, Terrorism
10. Gender Equality
11. Scientific Temper and Progress
12. Philosophy of Ecology

Section – II

Philosophy of Religion

1. Nature of God : Personalistic, Impersonal vis - Pantheistic
2. Proofs for the Existence of God and their criticism
3. Grounds for Disbelief in God and their criticisms
4. Problem of Evil
5. Religious Language, Reason, Revelation and Mysticism
6. Karma, Rebirth and Reincarnation etc.
7. Soul, Disembodied Existence and Immortality

PHYSICS

Paper-I

Section-A

1. Classical Mechanics
(a) Particle dynamics

Centre of mass and laboratory coordinates, conservation of linear and angular momentum. The rocket equation. Rutherford scattering. Galilean transformations, inertial and non-inertial frames, rotating frames, centrifugal and Coriolis forces. Frictional problems.

(b) System of particles

Holonomic and non-holonomic constraints, degrees of freedom, generalized coordinates and momenta. Lagrange's equations and applications to linear harmonic oscillator, simple pendulum and several more problems. Cyclic coordinates. Hamiltonian, Lagrange's equations from Hamilton's principle.

(c) Rigid body dynamics

Inertial angles, inertia tensor, principal moments of inertia. Euler's equation of motion of a rigid body, force free motion of a rigid body. Gyroscope.

2. Special Relativity, Waves & Geometrical Optics

(a) Special Relativity

Michelson-Morley experiment and its implications. Lorentz transformations-length contraction, time dilation, addition of velocities and Doppler effect, mass-energy relation and its simple applications to decay process. Minkowski diagram, four dimensional momentum vector.

(b) Waves

Simple harmonic motion, damped oscillation. Forced oscillation and resonance. Beats. Stationary waves in a string. Pulses and wave packets. Phase and group velocities.

(c) Geometrical Optics

Laws of reflection and refraction from Fermat's principle. Matrix method in paraxial optics-thin lens formula, nodal planes, system of thin lens, chromatic and spherical aberrations.

3. Physical Optics

(a) Interference

Interference of light-Young's experiment, Newton's rings, interference by thin films, Michelson interferometer, Multiple beam interference and Fabry-Perot interferometer. Holography and simple applications.

(b) Diffraction

Fraunhofer diffraction-single slit, double slit, diffraction grating, resolving power; Fresnel diffraction: half-period zones and zone plates. Fresnel integrals. Application of Cornu's spiral to the analysis of diffraction at a straight edge and by a long narrow slit. Diffraction by a circular aperture and the Airy pattern.

(c) Polarisation and Modern Optics

Production and detection of linearly and circularly polarized light. Double refraction, Quarter wave plate. Optical activity. Lasers-Einstein A and B coefficients. Ruby and He-Ne lasers. Characteristics of laser light-spatial and temporal coherence. Focussing of laser beams. Three-level scheme for laser operation. Principles of fibre optics, pulse dispersion in single mode fibre.

Section-II

4. Electricity and Magnetism

(a) Electrostatics and Magnetostatics:

Laplace and Poisson equations in electrostatics and their applications. Energy of a system of charges, multipole expansion of scalar potential; Method of images and its applications. Potential and field due to a dipole. Force and torque on a dipole in an external field. Dielectrics, polarisation. Solutions to boundary-value problems-conducting and dielectric spheres in a uniform electric field. Magnetic shell, uniformly magnetised sphere. Ferromagnetic materials, hysteresis, energy loss.

(c) Current Electricity

Kirchhoff's laws and their applications. Biot-Savart law, Ampere's law, Faraday's law, Lenz' law. Self and mutual inductances. Mean and rms values in AC circuits. LR, CR and LCR circuits (series and parallel resonance). Quality factor. Principle of transformer.

7. Electromagnetic Theory & Wave Body Mechanics

(a) Electromagnetic Theory

Displacement current and Maxwell's equations. Wave equations in vacuum. Poynting theorem. Vector and scalar potentials. Gauge transformations. Lorentz and Coulomb gauges. Electromagnetic field tensor, covariance of Maxwell's equations. Wave equations in isotropic dielectrics, reflection and refraction at the boundary of two dielectrics. Fresnel's relations. Normal and anomalous dispersion. Rayleigh scattering.

(b) Blackbody radiation

Blackbody radiation. Wien displacement law and Rayleigh-Jeans law. Planck radiation law. Stefan-Boltzmann law.

8. Thermal and Statistical Physics

(a) Thermodynamics

Laws of thermodynamics, reversible and irreversible processes, entropy. Isothermal, adiabatic, isobaric, isochoric processes and entropy change. Otto and Diesel engines. Gibbs' phase rule and chemical potential. Van der Waals equation of state of a real gas, critical constants. Maxwell-Boltzmann distribution of molecular velocities, transport phenomena, equipartition and virial theorems. Dulong-Petit, Einstein, and Debye's theories of specific heat of solids. Maxwell relations and applications. Clausius-Clapeyron equation. Adiabatic demagnetization, Joule-Kelvin effect and liquefaction of gases.

(b) Statistical Physics

Statistical ensembles – Microcanonical, Canonical and Grand-canonical ensembles. Maxwell-Boltzmann distribution law, Gibbs paradox.

Paper-II

Section-A

1. Quantum Mechanics I

Inadequacies of classical mechanics-Black Body Radiation Spectrum, Photo Electric Effect, Compton Effect, Stability of atoms, de-Broglie relation, Wave-particle duality, Schrodinger equation and expectation values. Uncertainty principle. Solutions of the one-dimensional Schrodinger equation for particle in Gaussian wave-packet, particle in a box, particle in a finite well, linear harmonic oscillator. Reflection and transmission by a potential step and by a rectangular barrier. Use of WKB formula for the life-time calculation in the alpha-decay problem.

2. Quantum Mechanics II & Atomic Physics

(a) Quantum Mechanics II

Particle in a three dimensional box, Eigen values and eigen functions of angular momentum operators, spherical harmonics. The hydrogen atom. Orbital angular momentum and spin.

(b) Atomic Physics

Stern-Gerlach experiment, electron spin, fine structure of hydrogen atom, L-S coupling, J-J coupling, Spectroscopic notation of atomic states, Zeeman effect.

3. Molecular Physics

Elementary theory of rotational, vibrational and electronic spectra of diatomic molecules. Raman effect and molecular structure. Laser Raman spectroscopy. Importance of neutral hydrogen atom, molecular hydrogen and molecular hydrogen ion in astronomy. Fluorescence and Phosphorescence. Elementary theory and applications of NMR. Elementary ideas about Mossbauer spectroscopy.

Section-B

4. Nuclear Physics

Basic nuclear properties-size, binding energy, angular momentum, parity, magnetic moment. Semi-empirical mass formula and applications. Mass parabolas. Ground state of deuteron, magnetic moment and non-central forces. Meson theory of nuclear forces. Salient features of nuclear forces. Shell model of the nucleus-success and limitations. Violation of parity in beta decay. Gamma decay and internal conversion. Q-value of nuclear reactions. Nuclear fission and fusion, energy production in stars. Nuclear reactors.

3. Particle Physics & Solid State Physics

(a) Particle Physics

Classification of elementary particles and their interactions. Conservation laws. Quark structure of hadrons. Field quanta of electroweak and strong interactions. Elementary ideas about: (i) Nuclear size of Fermi, Planck mass, Planck length, Planck time, Planck temperature and Planck energy.

(b) Solid State Physics

Crystal structure. Band theory of solids: conductors, insulators and semiconductors. Elements of superconductivity. Meissner effect, Josephson junctions and applications. Elementary ideas about high temperature superconductivity.

4. Electronics

Intrinsic and extrinsic semiconductors, p-n-p and n-p-n transistors, RC amplifier characteristics of class A, B & C amplifiers, Push-pull, Darlington pair, Phase shift oscillators, Hartley oscillators, Opamps, FET, JFET and MOSFET. Digital electronics-Boolean identities, De Morgan's laws, Logic gates and truth tables. Simple logic circuits. Transistors, solar cells. Fundamentals of microprocessors and digital computers. Principles of amplitude and frequency modulation and demodulation. Superheterodyne receivers. Ionospheric propagation of radio frequency waves.

POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

Paper-I

Political Theory

Section-A

1. Approaches to the study of political theory: historical, normative and empirical.
2. Theories of state: Liberal, Marxist, Post-colonial.
3. State Sovereignty: Monistic and Pluralistic theories; globalisation and the State.
4. Democracy: Contemporary theory: classical and current issues.
5. Human Rights: Theories of Human Rights; Theories of Justice, Equality and Revolution; Political obligation.
6. Theories of Political Culture and Political Economy.
7. Political Ideologies: Nature of Ideology; Liberalism, Socialism, Marxism, Fascism and Gandhism.
8. Theories of Power and Hegemony: Pareto, Mosca, Mitchels, C. Wright Mills, Weber and Gramsci.
9. Indian Political Thought: Manu, Kautilya, M.N. Roy, Gandhi and Ambedkar.
10. Western Political Thought: Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, J.S.Mill, Hegel and Marx, Lenin, and Mao Zedong.

Section-II

Indian Government and Politics

1. Indian Nationalism: Raja Ram Mohan Roy, Dadabhai Naoroji, Tilak, Gandhi, Nehru, Subhas Bose and Ambedkar.

2. Indian freedom struggle : Constitutionalism, Revolutionary movements, Non Cooperation,Civil Disobedience and Quit India, Role of women in freedom struggle.

3. Constitutional Development in the pre- Independence Era: Morley-Minto Reforms, Montego-Chelmsford Reforms,; Government of India Act, 1919 and 1935, and Cripps Mission.

4. Socio- economic dimensions of the nationalist movement: The communal question and its demand for partition, backward class movement, Dalit issues and Peasant movements, Civil rights movement.

5. Salient features of the Indian Constitution: The Preamble, Fundamental Rights and Duties, Directive Principles, federalism, parliamentary system, amending procedures, judicial review.

6. The Executive System: President, Prime Minister and the Council of Ministers, Governor, Chief Minister and the State Council of Ministers. The Bureaucracy. 7. Parliament : Lok Sabha and Rajya Sabha and Parliamentary Committees.

8. Judiciary: The Supreme Court and the High Courts, Judicial Activism.

9. Statutory institutions: Commission of SC, Election Commission, Comptroller and Auditor General, Backward Classes Commission, National Commission for women, National Human Rights Commission, Minorities Commission.

10. Party System : Ideology and social base of parties, fragmentation and regionalization, patterns of coalition politics, issues in electoral behaviour, Pressure groups.

11. Class, caste, backward class and Dalit movements : Tribal people's movements, gender in Indian politics and women's movements, ethnicity, communalism, and politics of regionalism.

12. Planning and Socio- Economic Development : Role of the Planning Commission, basic profile and dimensions of economic reforms.

13. Local Government: Panchayati Raj and municipal governance, significance of 73rd and 74th Amendments, Women empowerment.

14. State Politics in Odisha: Social basis of Oriya Nationalism, Unionist Movement and Praja Mandal Movements, in Odisha, integration of Princely States in Odisha, Coalition Politics, People's Movement and Women's Movement.

Paper – II

International Politics

Section-A

International Politics

1. International System: Evolution; The Modern State and Sovereign State System
2. Concepts of International politics: Power, balance of power, national interest, national security
3. Theories of International politics: Idealist, Realist, Systems, Decision-making and Game Theory
4. Determinants of foreign policy: Ideology, Domestic compulsions, geopolitics, and global order
5. Origin and decline of Cold War, New World Order
6. Major issues of world politics: Cuban Missile Crisis, Vietnam War, Oil Crisis, Collapse of the Soviet Union, Yugoslav Crisis, Afghan Crisis, Iraq War;
7. Non-alignment: Nonaligned Movement, its resurgence in the post cold war era
8. Disarmament and Arms Control;
9. The evolution of the international economic order-from Bretton woods to WTO, the North-South dimension
10. UN and its specialized agencies
11. Regional organizations: ASEAN, EU, SAARC
12. Global Concerns – Human Rights, Ecology, Gender Issues

Section-II

India and the World

1. Indian Foreign Policy : Historical origins, determinants, the continuities of policymaking,continuity and change.
2. The Non-Alignment Movement : India's Contribution to NAM,Its contemporary relevance.
3. India and the major powers : USA, EU, China and Russia.
4. India and its neighbours: Pakistan, Sri Lanka, Bangladesh, Nepal.
5. Conflict and co-operation in South and South East Asia : Kashmir, SAARC, ASEAN.
6. India's Nuclear Policy: CTBT, NPT,CTBT
7. India and the UN System : India's role in UN Peace Keeping and global disarmament.
8. India and the international economic order: WTO, IMF, IBRD, Global issues.

PSYCHOLOGY

Paper I

Foundations of Psychology

Section A

1. **Introduction** : Psychology as a Science - Definitions and perspectives. Psychology in relation to other social and natural sciences. Use of interdisciplinary approach.

2. **Methods of Psychology**: Characteristics and components of methods in psychology (deduction, induction and [illegible]). Observation, Survey, Laboratory and field experiments. Clinical and Case study. Experimental and quasi experimental methods.

3. **Research methods and quantitative analysis** : Major steps in psychological research (problem statement, hypothesis formulation, research design, sampling, tools of data collection, analysis and interpretation and report writing). Methods of data collection (interview, observation, questionnaire and case study). Application of statistical techniques (t-test, two-way ANOVA, correlation and chi-square tests).

4. **Development of Human Behaviour** : The nature, origin and development. Role of genetic and environmental factors in determining human behaviour. Influence of cultural factors and socialization. Influence of social rearing practices and its impact on the growth and development of the individual.

5. **Attention and perception** : Attention – Determinants of attention including set and characteristics of stimulus. Definition and concept of perception, biological and cultural factors in perception. Perception, organization and influence of past experiences. Perceptual defence. Space and depth perception, size estimation and perceptual readiness.

6. **Learning** : Concepts and theories of learning (Pavlov, Skinner). The processes of extinction, discrimination and generalization. Programmed learning, self instructional learning, concepts, types and the schedules of reinforcement. Modelling and social learning. Cognitive view of learning.

7. **Memory** : Concepts and definition of memory and forgetting. STM-LTM concept and chunking. Encoding, storage and retrieval. Factors influencing retention and forgetting. Theories of forgetting (Repression, Decay and Interference theories).

Section-B

8. **Thinking and Problem Solving** : Concept formation processes. Reasoning and problem solving. Creative thinking and fostering creativity. Information processing. Decision making and judgement.

9. **Intelligence and Aptitude** : Concept and definition of intelligence and aptitude. Nature and theories of intelligence. Measurement of intelligence and aptitude. Concept and measurement of emotional and multiple intelligence.

10. **Motivation and Emotion** : Definition and concepts. Theories and physiological basis of motivation and emotion. Measurement of motivation and emotion. Motivation and emotion their effects on behaviour.

11. **Personality** : Concept and definition of personality. Theories of personality (psychoanalytical, humanistic, behaviouristic, trait and type approaches). Measurement of personality (projective tests, self report measures). The Indian approach to Personality. Training for personality development.

12. **Language and Communication** : Human language-properties, structure and linguistic hierarchy. Language acquisition-predisposition, critical period hypothesis. Theories of language development (Skinner, Chomsky). Process and types of communication. Effective communication and training.

13. **Attitudes, Values and Interests** : Definitions, concepts of attitudes, values and interests. Formation and maintenance of attitudes. Measurement of attitudes, values and interests. Techniques of attitude change, strategies for fostering values.

14. **Recent Trends** : Computer application in the Psychological laboratory and psychological testing. Artificial Intelligence. Psychocybernetics. Study of consciousness-sleep-wake schedules, dreams, stimulus deprivation, meditation, hypnotic/drug induced states. Extrasensory perception.

Paper II

Psychology : Issues and Applications

Section A

1. **Psychological Measurement of Individual Differences** : The nature of individual differences. Characteristics and construction of standardized psychological tests. Types of psychological tests. Use, misuse and limitation of psychological tests. Ethical issues in the use of psychological tests.

2. **Well being and Mental Disorders** : Concept of health, positive health, well being and ill health. Mental disorders (Anxiety disorders, mood disorders, schizophrenia and delusional disorders; personality disorders, substance abuse disorders). Causal factors in mental disorders. Factors influencing positive health, well being, life style and quality of life.

3. **Therapeutic Approaches** : Psychodynamic therapies. Behaviour therapies. Client centered therapy. Cognitive therapies. Indigenous therapies (Yoga, Reiki, Meditation) Biofeedback therapy. Prevention and rehabilitation of the mentally ill.

4. **Work Psychology and Organisational Behaviour** : Personnel selection and training. Use of Psychological tests in the industry. Training and human resource development. Theories of work motivation. Leadership and participatory management. Advertising and marketing.

5. **Application of Psychology to Educational Field** : Psychological principles underlying effective teaching-learning process. Learning styles. Gifted, retarded, learning disabled and their training. Training for improving memory and better academic achievement. Personality development and value education. Educational, vocational guidance and Career counselling. Use of Psychological tests in educational institutions.

6. **Community Psychology** : Definition and concept of Community Psychology. Role of community psychologists in social change. Use of small groups in social action. Arousing community consciousness and action for handling social problems. Group decision making and leadership for social change.

7. **Rehabilitation Psychology** : Primary, secondary and tertiary prevention programmes-role of psychologists. Organising of services for rehabilitation of physically, mentally and socially challenged persons including old persons. Rehabilitation of persons suffering from substance abuse, juvenile delinquency, criminal behaviour. Rehabilitation of victims of violence. Rehabilitation of HIV/AIDS victims.

Section-D

7. **Application of Psychology to disadvantaged groups** : The concepts of disadvantaged, deprivation and socially deprived. Social, physical, cultural and economic environment of disadvantaged and deprived groups. Educating and motivating the disadvantaged towards development.

8. **Psychology and the problem of social integration** : The concept of social integration. The problem of caste, class, religion and language conflicts and prejudices. Nature and manifestations of prejudice between the language and religious groups. Causal factors of inter-conflicts and prejudices. Psychological strategies for handling the conflicts and prejudices. Measures to achieve social integration.

9. **Application of psychology in Information Technology and Mass media** : The present scenario of information technology and the mass media issues and the role of psychologists. Selection and training of psychology professionals to work in the field of IT and mass media. Multilevel marketing, impact of TV and Marketing value through IT and mass media. Psychological consequences of recent developments in Information Technology.

10. **Application of Psychology in the field of Defence** : The concept of Military psychology, Combat psychology and Psychological warfare. Role of Military psychologists in the defence. Selection, classification and training of personnel. Facilitating the process of adjustment of personnel to military life Role of Counselling. Devising Psychological tests for defence personnel. Psychological disorders due to war. Human engineering in Defence.

11. **Psychology and Economic development** : Architecture of rural culture and economic development. Characteristics of entrepreneurial behavior. Motivating and Training people for entrepreneurship and economic development. Women Entrepreneurs.

12. **Application of psychology to environment and related fields** : Environmental psychology-effects of noise, pollution and crowding. Population psychology-psychological consequences of population explosion and high population density. Motivating for small family norms. Impact of rapid scientific and technological growth on degradation of environment.

13. **Other applications of psychology** : Sports psychology-improving performance of sports personnel, Psychology and understanding of political behaviour, Voting behaviours. Psychology of corruption and strategies to deal with. Psychology of terrorism

PUBLIC ADMINISTRATION

Paper-I
Administrative theory

Section-A

1. **Basic Concepts** : Meaning, Scope and Significance of Public Administration; Public and Private Administration; Evolution of the discipline; New Public Administration; Public Choice Approach; State versus Market; New Public Management Perspective; Good Governance.

2. **Principles and Theories of Organisation** : Hierarchy, Unity of Command, Span of Control, Authority and Responsibility, Coordination, Supervision, Centralisation and Decentralisation, Delegation; Classical Theory; Scientific Management Theory; Bureaucratic Theory; Human Relations Theory; Systems Approach; Contingency Approach.

3. **Structures of Public Organisations** : Chief Executive – types, Functions; Types of Public Organisations – Ministries and Departments, Corporations, Companies, Boards, Commissions; Headquarters and Field Relationship; Line and Staff.

4. **Administrative Behaviour** : Leadership, Policy Formulation, Decision Making, Communication, Motivation, MBO.

5. **Accountability and Control**: Concepts, Legislature, Executive and Judicial Control; Citizen and Administration; Civil Society, People's Participation, Right to Information; Corruption in Administration, Machinery for redressal of Citizens' grievances, Citizens' Charter.

Section - B

6. **Administrative Law and Administrative Reforms :** Delegated Legislation, Administrative Adjudication, Administrative Reforms – Process, Techniques, O & M, Work study, Work management, Information Technology.

7. **Comparative Public Administration and Development Administration :** Comparative Public Administration – Meaning, Nature, Scope, Models – Bureaucratic and Ecological, Development Administration – Meaning, Nature and Scope, Bureaucracy and Development, Development Administration and Administrative Development.

8. **Public Policy:** Relevance of Public Policy, Process of Policy Formulation, Policy Implementation, Evaluation.

9. **Personnel Administration** : Objectives, Importance, Training, Position Classification, Performance Appraisal, Promotion, Pay and Service Conditions, Employer-employee relations, Grievance redressal mechanisms, Integrity, Code of Conduct.

10. **Financial Administration:** Budget – Concepts, Forms, Formulation, Execution, Performance Budgeting, Accounts, Audit.

Paper - II

Section - A

1. **Evolution of Indian Administration** : Ancient Period, Medieval Period, Modern Period up to 1947.

2. **Constitutional Framework** : Preamble, Salient Features of Indian Constitution, Federalism, Fundamental Rights, Directive Principles of State Policy.

3. **Central Administration in India** : President, Prime Minister, Council of Ministers, Central Secretariat, Cabinet Secretariat, Prime Minister's Office, Ministries and Departments, Advisory Bodies, Boards and Commissions, Field Organizations, Planning Commission, Finance Commission, Election Commission.

4. **State Administration with special reference to Odisha**: Governor, Chief Minister, Secretariat, Chief Secretary, Directorate, District Administration, Block Administration.

5. **Local Government** : Evolution, 73rd and 74th Constitutional Amendments, Rural and Urban Local Governments in Odisha – Structures, Functions, Financial Problems and Prospects, Major Rural and Urban Development Programmes and their management.

Section – II

6. **Public Services :** All India Services – Constitutional Provision, Role, Functions; Central Services – Nature, Functions, Examination, Training, Promotion; Union Public Service Commission; State Services; Odisha Public Service Commission.

7. **Control of Public Expenditure:** Parliamentary Control, Estimate Committee, Public Accounts Committee, Committee on Public Undertakings, Comptroller and Auditor General of India, Ministry of Finance.

8. **Machinery of Planning:** Planning Commission – Composition, Functions, Role; National Development Council; Planning Process – National Planning, State Planning, District Planning.

9. **Welfare Administration:** Human Rights – National Human Rights Commission, Odisha Human Rights Commission; Machinery for Welfare administration at the National and State levels, Central Social Welfare Board and State Social Welfare Boards, Suicidal registrations for the welfare of the Scheduled Castes and Scheduled Tribes, Welfare Programmes for Women and Children.

10. **Major Issues in Indian Administration:** Centre-State Relations; Political and Permanent Executive Relations; Administrative Culture and Ethics; Corruption in Indian Administration – Lok Pal and Lok Ayuktas; Environmental Issues – Disaster Management; Centre-Leaders of Politics and Administration; New Economic Policy and Public Enterprises; IT and Indian Administration.

SOCIOLOGY

Paper I

Foundations of Sociology

1. **Sociology-The Discipline:** Sociology as a science and as an interpretive or discursive discipline. Impact of Industrial and French Revolution on the emergence of sociology, sociology and its relationship with history, economics, political science, psychology and anthropology.

2. **Scientific Study of Social Phenomena :** Problems of objectivity and value neutrality; issue of reductionism in social sciences; elements of scientific method-concepts, theory and fact, hypothesis; research designs-descriptive, explanatory and experimental, inclusive area wise.

3. **Techniques of data collection and analysis :** Participant and quasi participant observation, interview, questionnaire and schedule; case study; sampling-size, reliability and validity; reading multivariate social relations and Likert scale.

4. **Pioneering contributions to Sociology:**

a) Karl Marx : Historical materialism, alienation and class struggle.

b) Emile Durkheim : Division of labour, social fact, religion and society, suicide.

c) Max Weber : Social action, ideal types, authority, bureaucracy, protestant ethic and the spirit of capitalism.

d) Talcott Parsons : Social system, pattern variables.

e) Robert K. Merton : Latent and manifest functions, anomie, reference group and role-sets, reference groups.

5. **Marriage and Family :** Types and forms of marriage; family-structure and functions; personality and socialization; Social control; Family, lineage, descent and property; changing structure of family and marriage in modern society; divorce and its implications; role conflicts.

6. **Social Stratification :** Concepts-hierarchy, inequality and social fixation; theories of stratification-Marx, Davis and Moore and Melvin Tumin's critique; forms and functions; closed-Tumer conception of class; class-in-itself and class-for-itself; caste and class; caste as a class.

7. Social Stability : Types of social system and closed societies, open-end inter-generational mobility, vertical and horizontal mobility, social stability and social change.

8. Economic System : Sociological dimensions of economic life, the impact of economic processes on the larger societies, social aspects of division of labour and types of exchange, features of pre-industrial and industrial economic system, industrial society and social change; social determinants of economic development.

9. Political System : The nature of power-personal power, community power, power of the elite, class power, organizational power, power of the un-organized masses, authority and legitimacy, pressure groups and political parties; voting behaviour, results of political participation-democratic and authoritarian forms.

10. Educational System : Education and Culture, equality of educational opportunity, social aspects of mass education, problems of universalization of primary education, role of community and state intervention in education, education as an instrument of social control and social change, education and modernization.

11. Religion : Origin of religious beliefs in pre-modern societies, the sacred and the profane, social functions and dysfunctions of religion, monistic and pluralistic religion, organized and unorganized religion, symbiosis and antagonism; religion, and social magic, religion and science.

12. Social Change and Gender Issues Social construction of gender, Equality vs. Differences, impact of globalization on women, emergence of feminist thought, gender issues.

Paper-II

1. Historical Moorings of the Indian Society :

Traditional Hindu social organization; socio-cultural dynamics through the ages; impact of Buddhism, Islam, and the West; factors in continuity and change.

2. Caste System :

Origin of the caste system; cultural and structural views about caste; mobility in caste; caste among Muslims and Christians; change and persistence of caste in modern India; issues of equality and social justice; views of Gandhi and Ambedkar on caste; caste and Indian polity; Backward Classes Movement; Mandal Commission Report and issues of social backwardness and social justice; emergence of Dalit consciousness; backward caste movement.

3. Class Structure :

Class structure in India; agrarian and industrial class structure; emergence of middle class; emergence of classes among tribes; elite formation in India.

4. Marriage, Family and Kinship :

Marriage among different religious and tribal groups, its changing trends and its future; family-its structural and functional aspects-its changing forms; regional variations in kinship systems and its socio-cultural correlates; impact of legislation and socio-economic change on marriage and family; generation gap.

5. Agrarian Social Structure :

Peasant society and agrarian systems; land tenure systems-historical perspectives; social consequences of land reforms and green revolution; feudalism-semi-feudalism debate; emerging agrarian class structure; peasant movements.

6. Industry and Society :

Path of industrialization; occupational diversification; trade unions and human relations; market economy and its social consequences; economic reforms: liberalization, privatization and globalization.

7. Political Processes :

Working of the democratic political system in a multi-ethnic society; political parties and their social base; social structure, origins of political elites and their orientations; regionalism, pluralism and national unity; decentralization of power; panchayati raj and municipalities and 73rd and 74th constitutional amendments.

8. Education :

Education Principles of State Policy and primary education; educational inequality and change; educational and social mobility; the role of community and state intervention in education; universalization of primary education; Total Literacy Campaigns; educational problems of disadvantaged groups.

9. Religion and Society :

Size, growth and regional distribution of different religious groups; educational levels of different groups; problems of religious minorities; communal tensions; secularism; communalism; religious fundamentalism; religious reform movements.

10. Tribal Societies :

Distinctive features of tribal communities and their geographical spread; problems of tribal communities and alienation; health and nutrition; education; tribal development efforts after independence; tribal policy; tensions, conflicts and integration; issues of tribal identity.

11. Social Change and Development :

Endogenous and exogenous sources of change and resistance to change; processes of change-modernization and modernization; agents of change-mass media, education and communication; problems of change and modernization; structural contradictions and transformation; Migration; Determinants and consequences of population growth; population policy and family welfare programmes; child welfare programmes.

12. Major Social Issues :

Poverty, indebtedness, bonded labour, unemployment, dependency of labour, development related displacement, corruption, alcoholism, AIDS, drug addiction, violence against women, slavery. Child labour. Maternal and infant mortality rate in Odisha.

STATISTICS

PAPER - I

Section – A

Probability :

Unit – I

Sample space and events, probability measure and probability space, random variable as a measurable function, distribution function of a random variable, discrete and continuous-type random variable, probability mass function, probability density function, vector-valued random variable, marginal and conditional distributions, stochastic independence of events and of random variables, expectation and moments of a random variable, conditional expectation, convergence of a sequence of random variables in distribution and in probability almost everywhere, their criteria and inter-relations, Borel-Cantelli lemma, Chebyshev's and Khinchine's weak law of large numbers, strong law of large numbers and Kolmogorov's theorems, Glivenko-Cantelli theorem.

Unit – II

Probability generating function, characteristic function, inversion theorem, Laplace transform, determination of distribution by its characteristic function, Lindeberg and Levy forms of central limit theorem, standard discrete and continuous probability distributions, their interrelations and limiting cases (Bernoulli, Binomial, Negative Binomial, Poisson, Normal, Cauchy, Beta and Gamma), Exponential family of distributions and their properties.

Linear Models and Multivariate Analysis

Unit – III

Linear statistical models, theory of least squares and analysis of variance, Gauss-Markov theorem, normal equations, least squares estimates and their properties, test of significance and interval estimates based on least squares theory in one-way, two-way and three-way classified data, regression analysis, linear regression, curvilinear regression and orthogonal polynomials, multiple regression, multiple and partial correlations, estimation of variance and covariance components, MINQUE theory.

Unit – IV

Multivariate normal distribution, Marginal and conditional distributions, Distribution of linear and quadratic functions of multivariate normal, independence of the distribution of quadratic functions, Wishart's distribution, Mahalanobis D^2 and Hotelling's T^2 statistics and their applications and properties, discriminant analysis, canonical correlations, principal component analysis, elements of factor analysis.

Section – B

Statistical Inference

Unit-I

Consistency, sufficiency, efficiency, sufficiency, minimal sufficiency, completeness, ancillary statistics, factorization theorem, derivation of sufficient statistics for the exponential family of distributions, unbiasedness, uniformly minimum variance unbiased (UMVU) estimation, Rao-Blackwell and Lehmann-Scheffe theorems, Cramer-Rao inequality for single and several parameter family of distributions, illustrate various forms of estimators and its properties, Chapeau-Robbins inequality, Bhattacharya's bounds, estimation by methods of moments, maximum likelihood, least squares, minimum chi-square and modified minimum chi-square, properties of maximum likelihood estimators, idea of asymptotic efficiency, Loss and Risk functions, idea of prior and posterior distributions, Bayes' and minimax estimators.

Unit – II

Neyman-structured and covariance free tests, critical functions, MP tests, Neyman-Pearson lemma, UMP tests, monotone likelihood ratio, generalized Neyman-Pearson lemma, randomized tests and unbiased tests, UMPU tests for single and several parameters (one line idea of observations), likelihood ratio and its large sample properties, chi-square problems of fit and test for asymptotic distribution, Confidence intervals and its relation with tests, Kolmogorov's test for goodness of fit and its consistency, sign test, Wilcoxon signed-rank test and their consistency, Kolmogorov-Smirnov two-sample test, run test, Wilcoxon-Mann-Whitney U-test and median test, their consistency and asymptotic normality, Wald's SPRT and its properties, OC and ASN functions, Wald's fundamental identity, applications to Binomial, Poisson and Normal distributions only.

Sampling Theory and Design of Experiments

Unit – III

An outline of finite-population and superpopulation approaches, distinctive features of finite population sampling, sampling designs, simple random sampling with and without replacement, stratified random sampling, systematic sampling and its efficiency for a linear population, cluster sampling, two-stage and three-stage sampling, ratio, product and regression methods of estimation involving one or more auxiliary variables, two-phase sampling, probability proportional to size sampling with and without replacement, the Hansen-Hurwitz and the Horvitz-Thompson estimators, non-negative variance estimation with reference to the Horvitz-Thompson estimator, non-sampling errors, Warner's randomized response technique.

Unit – IV

Fixed effect model (one-way and two-way classifications), random and mixed effect models (one-way and two-way classifications), basic principles of design, CRD, RBD, LSD and their usefulness and efficiencies, missing plot technique, factorial designs : 2^2, 2^3 and 3^2, confounding in factorial experiments, split-plot, simple-plot and simple lattice designs, incomplete block designs, concepts of orthogonality and balance, BIBD.

PAPER – II

Section – A

Industrial Statistics

Unit – I

Process and product control, general theory of control charts, different types of control charts for variables and attributes, concept of 3σ limits, $\bar{X}$, R, s, p, np and c charts, cumulative sum chart, V-mask. Single, double, multiple and sequential sampling plans for attributes, OC, ASN, AOQ and ATI curves, concepts of producer's and consumer's risks, AQL, LTPD and AOQL, sampling plans for variables, use of Dodge-Romig tables.

Unit – II

Concept of reliability, maintainability and availability, reliability of series and parallel systems, Hazard function, IFR and DFR classified life survival models (exponential, Weibull, lognormal, Rayleigh, and Bath-tub), problems in life-testing, censored and truncated experiments for exponential models.

Quantitative Economics and Official Statistics

Unit – III

Concept of time series, additive and multiplicative models, determination of trend, seasonal, cyclical and random components. Box-Jenkins method, tests for stationarity of series, ARIMA models and determination of orders of autoregressive and moving average components, forecasting. Commonly used index numbers - Laspeyre's, Paasche's and Fisher's ideal index numbers, chain-base index number, uses and limitations of index numbers, index number of wholesale prices, consumer price index number, index numbers of agricultural and industrial production, tests for index numbers like proportionality test, time-reversal test, factor-reversal test, circular test and dimensional invariance test. General linear model, ordinary least squares and generalized least squares methods of estimation, problem of multicollinearity, consequences and solutions of multicollinearity, autocorrelation and its consequences, heteroscedasticity of disturbances and its testing, test for independence of disturbances.

Unit – IV

Present official statistical system in India relating to population, agriculture, industrial production, trade and prices, methods of collection of official statistics, their reliability and limitations and the principal publications containing such statistics, various official agencies responsible for data collection and their main functions.

Section – II :

Optimization Techniques

Unit – I

Different types of models in Operational Research, their construction and general methods of solution, simulation and Monte Carlo methods, the structure and formulation of linear programming (LP) problem, simple LP model and its graphical solution, the simplex procedure, the two-phase method and the M-technique with artificial variables, the duality theory of LP and its economic interpretation, sensitivity analysis, transportation and assignment problems, rectangular games, two-person zero-sum games, methods of solution (graphical and algebraic). Replacement of failing or deteriorating items, group and individual replacement policies, concept of scientific inventory management and simple models of inventory problems.

Unit – II

Simple models with deterministic and stochastic demand with and without lead time, storage models with particular reference to dam type. Homogeneous discrete-time Markov chains, simple properties of Chain Markov chains, transition probability matrix, classification of states and ergodic theorems, Formulation and construction Markov chains, Poisson process, elements of queueing theory, M/M/1, (GD/∞) and M/G/1 queues.

Demographic and Psychometry

Unit – III

Demographic data from census, registration, NSS and other surveys and their limitations and uses, definition, construction and uses of vital rate and ratios, measures of fertility, reproduction rates, mortality rate, standardized death rates, Infant mortality rate, nuptiality, complete and abridged life tables, construction of life tables from vital statistics and census returns, uses of life tables, logistic and other population growth curves, fitting of a logistic curve, population projections, stable population, quasi-stable population, techniques in estimation of demographic parameters, morbidity and its measurements, standardized mortalities by means of death, health surveys and uses of hospital statistics, health statistics.

Unit – IV

Methods of standardization of scales and tests, Z-scores, standard scores, T-scores, percentile scores, intelligence quotient and its measurements and uses, validity of test scores and its determination, use of factor analysis and path analysis in psychometry.

ZOOLOGY

PAPER-I

Section-A (Non-chordata and chordata)

UNIT - I - Non-chordata

General Survey : General organisation and classification of Invertebrates up to order; Origin of metazoa; Origin of acoelomates, pseudocoelomates and eucoelomates, protostomes and deuterostomes; Symmetry in animals.

Protozoa : Locomotion, nutrition and reproduction in protozoa; Parasitic protozoa; Life history of *Paramoecium*, *Monocystis*, *Plasmodium* and *Trypanosoma*.

Porifera : Canal system; Skeleton; Reproduction in sponges. **Coelenterata :** Polymorphism in coelenterates; Coral and coral reefs; structure and life history of *Obelia* and *Aurelia*.

Helminthes : Structure and life history of *Fasciola*, *Taenia* and *Ascaris*; Parasitic adaptations.

UNIT - II - Non chordata

Annelida : Metamerism; Coelom; Segmental organs; Structure and Life history of *Nereis*, earthworm and leech; Excretory and nervous system of annelida.

Arthropoda : Structure and affinities of *Peripatus*; Structure and life history of *Palaemon*, scorpion and cockroach; Larval forms and parasitism in crustacea; Vision in insects; Respiration in arthropods; Mouth parts of insects.

Mollusca : Foot and respiration in mollusca; Torsion and detorsion in gastropoda; Structure and life history of *Pila*, *Sepia*, *Unio*.

Echinodermata : Water vascular system; Larval forms and their phylogenetic significance; Life history of *Asterias*.

UNIT - III Chordata

General features : General organisation and classification of chordates up to orders; Origin of chordates.

Protochordates : Salient features and affinities of protochordate groups (hemichordata, cephalochordata and urochordata).

Cyclostomes and Pisces : Structure and affinities of cyclostomes and Dipnoi; Lateral line receptors; Accessory respiratory structures; Scales; Migration in fishes; General features of [illegible] and [illegible].

Amphibia : Origin and evolution of amphibia; Neoteny; Parental care; Structural peculiarities and affinities of Urodela and Apoda.

UNIT – IV - Chordata

Reptiles : Origin of reptiles; Adaptive radiation; Skull types; Poisonous and non-poisonous snakes of India; Mechanism of poison bite; Venom composition and mode of action; Sphenodon.

Aves : Origin of birds; Flight adaptations; Migration; Flightless birds.

Mammals : Origin of mammals; Dentition; Aquatic mammals; Prototheria and Metatheria.

Comparative anatomy : Origin and evolution of aortic arches, heart, brain, kidney, skin and endocrine glands (Pituitary, thyroid, parathyroid, adrenal and gonads) in different vertebrate groups.

Section - B

(Ecology, Ethology, Biostatistics and Economic Zoology)

UNIT – I

Ecology : Concept and components of ecosystem; Energy flow, food chain, food web, ecological pyramids and productivity; Abiotic factors (soil, light and temperature); Biotic factors; Biogeochemical cycles (carbon, nitrogen and sulphur); Ecological niche; Biotic community; Concept of population; Ecological succession; Pollution of air, water and soil; Global warming; Ozone layer depletion; Acid rain.

Biodiversity : Types of biodiversity (α, β and γ); Mega biodiversity countries; Biodiversity indices; Key stone species; Biodiversity conservation (in situ and ex situ); Germplasm conservation; Intellectual property rights and patents; Biodiversity hot spots in India; Resource management; Wildlife and its management; Endangered species; Wildlife in Odisha.

UNIT – II

Ethology : Concept and method of studying animal behavior; Role of hypothalamus, hormones and pheromones in regulation of behavior; Physiological basis of behavior; Types and Mechanism of learning; Biochemical basis of memory; Social behavior in insects and primates; Biological clock; Courtship, mating and parental care; Orientation; Navigation; Homing and migration; Tidal, seasonal and circadian systems.

UNIT – III

Economic Zoology : Apiculture; Sericulture; Lac culture; Induced breeding and carp culture; Pearl culture; Fresh water prawn culture; Insect and rodent pests of crops and stored grains and their control; Major infectious and communicable diseases (malaria, tuberculosis, cholera, plague, AIDS), their vectors, pathogens and prevention; Harmful parasites to man.

UNIT – IV

Biostatistics : Methods of sampling; Graphical representation of data; Measurement of central tendency; Standard deviation; Standard error; Probability distribution: Binomial, Poisson and Normal; Null hypothesis; Tests of significance (t, χ^2 and F tests); Simple correlation; Regression.

Instrumentation : Basic principles and applications of light microscopes and electron microscope (TEM and SEM); Electrophoresis; Chromatography; Colorimetry; Autoradiography; Flame photometry; GM counter; Scintillation counter; Principle of ELISA and Immunoblotting.

PAPER – II

Section – A

UNIT – I

Cell Biology : Ultra structure of animal cell ; Cell cycle; Ultra structure and function of cell organelles (plasma membrane, mitochondria, Golgi complex, endoplasmic reticulum, ribosomes, lysosomes and nucleus); Organization of eukaryotic chromosomes; Cell division - mitosis and meiosis; Spindle and mitotic apparatus; Chromosome movement; [illegible].

UNIT – II

Genetics : Gene structure and function; Watson-Crick model; DNA replication; Mechanism of gene regulation in prokaryotes and eukaryotes; Types of RNA; Genetic code and Wobble hypothesis; Protein synthesis; Molecular basis of mutation; Mendel's laws of inheritance; Linkage and linkage maps; Crossing over; Sex chromosomes; Sex determination; Sex linked inheritance; Structural rearrangements; Interaction of genes; Multiple factor inheritance; Human genetics: normal and abnormal karyotypes; Genes and diseases.

UNIT – III

Evolution : Origin of life; Evidences and theories of organic evolution (Darwinism, Lamarckism); Natural selection; Synthetic theory of evolution; Hardy-Weinberg law; Genetic drift; Mimicry; Role of mutation and isolation in evolution; Fossil records and dating of fossils; Evolution of horse, elephant and camel; Ancestry of man.

Systematics : Species concept; Principles of classification; Zoological nomenclature; International code of Zoological Nomenclature (ICZN); Importance of anatomy, cytology, biochemistry and physiology in taxonomy; Molecular taxonomy and Numerical taxonomy; Theories of distribution of animals; Zoogeographical realms of the world.

UNIT – IV

Molecular Biology and Biotechnology : Recombinant DNA; Restriction endonucleases; cloning technology; Plasmids, cosmids and Phagemids as cloning vectors; c-DNA; DNA sequencing; RAPD, RFLP and PCR and Human genome project; Polymerase chain reaction and DNA fingerprinting; Signal transduction; Biotechnology in the welfare of human race; Gene therapy; Production of transgenic animals and genetically modified organisms; Application of biotechnology in medicine, waste management and food production; Industrial biotechnology and production of biopharmaceuticals; Gene therapy and new age medicines.

Section – B

UNIT – I

Biochemistry : Structure of carbohydrates, lipids, amino acids, proteins and nucleic acids; functional and interconvertible fatty acids; Cholesterol, Glycolysis, Krebs cycle, Electron transport and oxidative phosphorylation, Cyclic AMP, its structure and role. Classification of enzymes, enzyme action and kinetics. Vitamins, Coenzymes, Membrane structure and functions, pH and buffers, Henderson-Hasselbalch equation, Thermodynamics and living processes, ATP and Bioenergetics.

UNIT – II

Physiology and Endocrinology : Composition of blood, Pigments of respiration, Blood coagulation, Blood groups, O2 and CO2 transport, Cardiac cycle, Breathing and its regulation, Structure of nephron, Urine formation, Acid-base balance, Structure of neuron, Conduction of impulse through the axon and synapse, Neurotransmitters, Mechanism of vision and hearing, Structure and mechanism of contraction of skeletal muscles, Digestion and absorption of principal food stuff, Function of pituitary, thyroid, parathyroid, adrenal, pancreas, and gonads, Hormones in insects and mammals, Haematopoiesis, regulation of secretion and mechanism of action of steroid and peptide hormones, Hormones of G-I tract, neuropeptides, Physiology of reproduction and artificial insemination, Hormones in

UNIT – III

Developmental Biology : Ultra structure of gametes, Gametogenesis, Types of eggs, Fertilization, Cleavage, Gastrulation and fate maps of frog and chick, Mammalian placenta and its function, Organizer concept, Organogenesis of central nervous system, heart and kidney in vertebrates, Stem cells and mechanism of differentiation, Histogenesis and morphogens, Genetic regulation of development, Homeotic genes, ageing, cell death and programmed cell death, Metamorphosis in frog and insects-Cellular, Biochemical and Physiological Accounts, Regeneration, Bioenergetics, in vitro fertilization and embryo transfer.

UNIT – IV

Microbiology : Structure of prokaryotes, Cellular organization of bacteria, Bacterial cell wall, Classification of bacteria, Bacterial transformation, transduction, conjugation, transfection, Antibiotics and their mode of action, Structure, classification, molecular architecture of virus(TMV, T4 and λ virus), lytogeny and lytic phages, Bacteria and viral diseases. **Immunology** : Innate and acquired immunity, Antigen antibody interaction, Types of antibody, Primary and secondary immunity, B and T cells, Humoral and cell mediated immune response, Hypersensitivity, Autoimmunity and auto immune diseases, Transplantation immunology, Vaccines and their preparation, Immunology of cancer.

MEDICAL SCIENCE

PAPER - I

1. Human Anatomy

Applied anatomy including blood and nerve supply of upper and lower limbs and joints of shoulder, hip and knee.
Chest wall anatomy. Blood supply and lymphatic drainage of tongue, thyroid, mammary gland, stomach, liver, prostate, gonads and uterus.
Applied anatomy of diaphragm, perineum and inguinal region.
Clinical anatomy of kidney, urinary bladder, ureter & bile, vas deferens.

Embryology: Placenta and placental barrier. Development of heart, gut, kidney, Uterus, mammary gland and their common congenital anomalies.

Central and Peripheral Autonomic Nervous System: Gross and clinical anatomy of ventricles of brain, circulation of cerebrospinal fluid, Neural pathways and lesions of numerous sensations, hearing and vision. Cranial nerves, distribution and clinical significance. Components of autonomic nervous system.

2. Human Physiology

Conduction and transmission of impulse, mechanism of contraction, neuromuscular transmission, reflexes, control of equilibrium, posture and muscle tone, descending pathways, functions of cerebellum, basal ganglia. Physiology of sleep and consciousness.

Endocrine System: Mechanism of action of hormones, formation, secretion, transport, metabolism, function and regulation of secretion of pancreas and pituitary gland.

Physiology of Reproductive System: Pregnancy menstrual cycle, lactation, pregnancy.

Blood: Development, regulation and fate of blood cells.
Cardio-vascular: cardiac output, blood pressure, regulation of cardiovascular functions.

3. Biochemistry

Organ function tests—liver, kidney, thyroid Protein synthesis
Vitamins and minerals
Restriction fragment length
polymorphism (RFLP)
Polymerase chain reaction (PCR)
Radio-immunoassays (RIA).

4. Pathology

Inflammation and repair: disturbances of growth and cancer, Pathogenesis and histopathology of rheumatic and ischaemic heart diseases and diabetes mellitus. Differentiation between benign, malignant, primary and metastatic malignancies, Pathogenesis and histopathology of bronchogenic carcinoma, carcinoma breast, oral cancer, cancer cervix, leukemia, Etiology, pathogenesis and histopathology of — cirrhosis liver, glomerulonephritis, tuberculosis, acute osteomyelitis.

5. Microbiology:

Humoral and cell mediated immunity.
Diseases caused by and laboratory diagnosis of —
* Meningococcus, Salmonella
* Shigella, Herpes, Dengue, Polio
* HIV/AIDS, Malaria, E. Histolytica, Giardia
* Candida, Cryptococcus, Aspergillus

6. Pharmacology:
Mechanism of action and side effects of the following drugs

* Antipyretic and analgesics, Antibiotics,
* Antimalaria, Antikala-azar, Antidiabetics,
* Antihypertensive, Antidiuretics, General and cardiac vasodilators, Antiviral, Antiparasitic, Antifungal, Immunosuppressants
* Anticancer

7. Forensic Medicine and Toxicology:
Forensic examination of injuries and wounds; Examination of blood and seminal stains; Poisoning, sedative overdose, hanging, drowning, burns, DNA and finger print study.

PAPER II

1. General Medicine

Etiology, clinical features, diagnosis and principles of management (including prevention) of— Typhoid, Rabies, AIDS, Dengue, Kala-azar, Japanese Encephalitis.
Etiology, clinical features, diagnosis and principles of management of:
Ischaemic heart disease, pulmonary embolism.
Bronchial asthma.
Pleural effusion, tuberculosis, Malabsorption syndromes; acid peptic diseases, Viral hepatitis and cirrhosis of liver.
Glomerulonephritis and pyelonephritis, renal failure, nephrotic syndrome, renovascular hypertension, complications of diabetes mellitus, coagulation disorders, leukaemia, Hypo and hyper thyroidism, meningitis and encephalitis.
Imaging in medical problems, ultrasound, echocardiogram, CT scan, MRI.
Anxiety and Depressive Psychosis and schizophrenia and ECT.

2. Paediatrics

Immunization, Baby friendly hospital, congenital cyanotic heart disease, respiratory distress syndrome, broncho— pneumonias, kernicterus. IMNCI classification and management, PEM grading and
management. ARI and Diarrhea of under five and their management.

3. Dermatology

Psoriasis, Allergic dermatitis, scabies, eczema, vitiligo, Stevan Johnson's syndrome, Lichen Planus.

i. General Surgery

Clinical features, causes, diagnosis and principles of management of cleft palate, harelip.
Laryngeal tumour, oral and esophageal tumours.
Peripheral arterial diseases, varicose veins, coarctation of aorta
Tumours of Thyroid, Adrenal, Glands
Abscesses cancer, fibroadenoma and adenosis of breast.
Bleeding peptic ulcer, tuberculosis of bowel, intestinal colitis, cancer stomach
Renal mass, cancer prostate
Haematuria, stones of Gall bladder, Kidney, Ureter and Urinary Bladder.

Management of surgical conditions of Rectum, Anus and Anal canal, Gall bladder and Bile ducts
Splenomegaly, cholecystitis, portal hypertension, liver abscess, peritonitis, carcinoma head of pancreas.
Fractures of spine, Colles' fracture and bone tumors.
Endoscopy
Laparoscopic Surgery.

ii. Obstetrics and Gynaecology including Family Planning

Diagnosis of pregnancy

Labour management, complications of 3rd stage, Antepartum and postpartum haemorrhage, resuscitation of the newborn, Management of abnormal lie and difficult labour, Management of small for date or premature newborn.
Diagnosis and management of anemia, Preeclampsia and Toxaemias of pregnancy, Management of Post menopausal Syndrome.
Intra-uterine devices, pills, Tubectomy and vasectomy. Medical termination of pregnancy including legal aspects.
Cancer cervix.
Leucorrhoea, pelvic pain, infertility, dysfunctional uterine bleeding (DUB), amenorrhoea, Fibroid and prolapse of uterus.

iii. Community Medicine (Preventive and Social Medicine)

Principles, methods approach and measurements of Epidemiology
Nutrition, nutritional diseases/disorders and Nutrition Programmes.
Health information Collection, Analysis and Presentation
Objectives, components and critical analysis of National programmes for control/eradication of:
Malaria, Kala-azar, Filaria and Tuberculosis,
HIV/AIDS, STDs and Dengue
Critical appraisal of Health care delivery system.
Health management and administration: Techniques, Tools, Programme Implementation and Evaluation.
Objectives, Components, Goals and Status of Reproductive and Child Health, National Rural Health Mission and Millennium Development Goals.
Management of hospital and industrial waste.