



# ODISHA PUBLIC SERVICE COMMISSION

WEBSITE – <http://opsc.gov.in>

ADVERTISEMENT NO.01 OF 2025-26.

## **Recruitment to the posts of Assistant Director of Factories and Boilers in Group-A (JB) of Odisha Factories and Boilers Inspection Service Cadre under the Labour and Employees' State Insurance Department**

Online applications are invited from the prospective candidates through the Proforma Application Form to be made available on the WEBSITE (<http://opsc.gov.in>). The link for registration and submission of online application form shall be available from **16.04.2025 to 15.05.2025 (Note- 15.05.2025 is the last date/closing date for submission of Registered Online Application)** for recruitment to **02** posts of Assistant Director of Factories & Boilers in the Group-A (JB) of Odisha Factories and Boilers Inspection Service Cadre under Labour & ESI Department in the scale of pay Rs. 56100/- in Level-12, Cell-1 of the pay matrix as per ORSP Rules, 2017 with usual Dearness and other Allowances as may be sanctioned by the Government from time to time. The Examination will be conducted in accordance with the provisions of the Odisha Factories and Boilers Inspection Service (Recruitment and Conditions of Service) Rules, 1984 as amended from time to time.

### **2. VACANCY POSITION:**

As per requisition submitted by Labour & ESI department, Government of Odisha, the category wise vacancy position along with reservation thereof is given below:

Sl. No.	Category	No. of Post
1	UR	01
2	SEBC	01
TOTAL =		<b>02</b>

#### **Note:**

- 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.
- Experience has shown that candidates obtain SEBC certificate prior to the date of application and upload the same along with online application. Such certificates sometimes get cancelled subsequently. If the cancellation of certificate is detected at any subsequent stage, the candidature of such candidates will be cancelled under that category.
- 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. AGE:**

A candidate must have attained the age of 21 years and must not be above the age of 32 years as on the **1<sup>st</sup> August, 2025**, i.e. he/she must not have been born earlier than **2<sup>nd</sup> August, 1993** and not later than **1<sup>st</sup> August, 2004**.

The upper age limit is relaxable by 05 (five) years for candidates belonging to S.E.B.C./ Women and Ex-Servicemen.

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 recruitment.**

**4. EDUCATIONAL QUALIFICATION:**

A candidate **should hold a Degree in Mechanical Engineering** of a recognised University or any qualification declared by the Union or State Public Service Commission as equivalent thereto and **should have practical experience of at least 2 years** in a workshop or manufacturing concern of good standing or in design, construction, operation or maintenance of boilers.

**Note:**

1. **The degrees/ subjects which are equivalent to a Degree in Mechanical Engineering are:**
  - A Mechanical Engineering degree obtained from any institute, which is recognized by AICTE *or*
  - A Mechanical Engineering degree obtained from "The Institution of Engineers" *or*
  - A Mechanical Engineering degree obtained from "Institution of Mechanical Engineers (India)".
2. **The Certificate showing Practical Experience of at least 2 years must have been obtained after completion of Degree in Mechanical Engineering.**
3. **The Authority competent to issue the Practical Experience Certificate shall be:**
  - Owner of the unit in case of a proprietorship firm;
  - Any one of the partner, in case of a partnership firm;
  - Anyone of the Director or Unit Head or HR Head in case of a Private Limited firm.
  - The unit Head or HR Head in case of a Public Limited firm
4. **Candidates are to upload their Practical Experience Certificate along with the online application form.**

## **5. EXAMINATION FEE:**

The examination fee for all categories of candidates has been exempted as per the Odisha Discontinuance of payment of application and examination fees for recruitment to different Posts and Services in the State Government Rules, 2022 made by **G.A. & P.G. Department Notification No. 9897/Gen, Dt-11.04.2022.**

## **6. METHOD OF SELECTION:**

There shall be a **Written Examination and Interview** to be conducted by the Commission in the manner prescribed below. The candidates who obtain such minimum qualifying marks in the Written Examination as may be fixed by the Commission shall be invited by them for an interview, and the total marks thus obtained by the candidates in the written examination and interview would determine their final ranking.

Provided that in case of two or more candidates securing the same marks in aggregate, the candidate securing higher marks in the written test will be assigned higher position over the others. In case of securing same marks in the written test as well as the interview, final ranking will be determined on the basis of age, i.e., those elder in age will be given preference over others.

<b><u>Scheme of Written Examination</u></b>				
(1)	(2)	(3)	(4)	(5)
Paper	Subject	Marks	No. of questions	Duration
I	General Studies and Mental Ability	100	100	2 hours
II	Mechanical Engineering	200	100	2 hours

**Note:**

- 1.The questions in both papers shall be of **multiple-choice type**.
2. All the questions in Paper-I will carry 1 mark each.
3. All the questions in Paper-II will carry 2 marks each.
4. There will be negative markings for wrong answers. **25 (twenty-five) percent** of marks allotted to a particular item (question) will be deducted as negative marking for every wrong response (answer).
5. The unit-wise distribution of questions in both papers shall be decided by the Commission.

**Interview:** The Interview shall carry **30 (thirty) marks**. No minimum qualifying marks for Interview shall be fixed.

The detailed syllabus is annexed as **Annexure-A**.

**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 Written Examination will be held on 3<sup>rd</sup> August, 2025 (Sunday). The detailed Schedule and Centre of Examination will be notified in due course.

## 8. PLACE OF EXAMINATION:

The venue of the Written Examination for the posts of Assistant Director of Factories and Boilers will be located at Cuttack. Request for change of Examination Centre shall not be entertained.

## 9. OTHER ELIGIBILITY CONDITIONS:

- (i) A candidate must be a citizen of India.
- (ii) He/she must be of sound mental and physical health, good physique and active habits and free from organic defects or bodily infirmity.
- (iii) He/she must be able to speak, read and write Odia and have-
  - (a) Passed M.E. School examination conducted by the Board of Secondary Education or an equivalent examination or any higher examination conducted by the competent authority with Odia as a language subject, or
  - (b) Passed Odia as a language subject in the final examination of Class-VII or above (to be certified by the Headmaster or Principal of the concerned Secondary School recognized by the Board of Secondary Education or by any other competent authority); or
  - (c) Odia as a medium of examination in non-language subjects at the Matriculation or equivalent examination which he has passed (to be certified by the Headmaster of the concerned High School recognized by the Board of Secondary Education), or
  - (d) Passed a test in Odia equivalent to M.E. school standard conducted by any District Inspector of Schools in the State of Odisha.
- (iv) 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.
- (v) 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 & 4 of the Advertisement respectively. They must inform their respective Heads of Departments in writing regarding submission of their application for this recruitment and furnish "**No Objection Certificate**" during document verification. **So, the candidates must obtain NOC well in advance.**
- (vi) If a candidate has, at any time, been debarred for a certain period/chance(s) by the Odisha Public Service Commission or other State Public Service Commission or U.P.S.C. from appearing at any Examination/Interview, he/she **will not be eligible** for such recruitment for that specified period/chance(s).
- (vii) **Only those candidates, who possess the requisite qualification and fulfil other eligibility conditions by the closing date of submission of online applications will be considered eligible.**

- (viii) The Period of Probation will be 2 years as prescribed in the recruitment rule.
- (ix) A candidate who claims change in his/her name after having passed the High School Certificate Examination or equivalent examination, is required to furnish copy of publication of the changed name in local leading daily newspaper as well as copy of notification in the Gazette in support of his/her change of name.
- (x) No candidate shall be appointed to the Service who, after such medical examination, as the State Government may prescribe, is not found to be free from any communicable disease and mental or physical defect likely to interfere with the discharge of the duties of the public service.

#### **10. IMPORTANT POINTS:**

- (I) 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 she/he 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.
- (II) The provisions of the Odisha Conduct of Examinations Act, 1988 (Odisha Act-2 of 1988) are applicable to this Examination conducted by the Odisha Public Service Commission.
- (III) A candidate who is/or has been declared by the Commission guilty of impersonation or of submitting fabricated document or documents which have been tampered with or of making statements which are incorrect or false or of suppressing material information or of using or attempting to use any unfair means or otherwise resorting to any other irregular or improper means for obtaining support for his candidature, may, in addition to rendering himself liable to a criminal prosecution, be debarred either permanently or for a specified period-
  - (i) By the Commission, from admission to any examination or from appearance at any interview held by them for selection of candidates, and
  - (ii) By the State Government from employment under them;
- (IV) **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.**
- (V) **Admission to the Written Examination/Interview will be provisional. If on verification at any stage before or after the Written examination/Interview/Publication of Result, it is found that a candidate does not fulfil all the eligibility conditions, his/her candidature will be liable to rejection. Decision of the Commission regarding eligibility or otherwise of candidate shall be final.**

- (VI) This advertisement should not be construed as binding on the Government to make appointment.
- (VII) **Reservation and Relaxation meant for SEBC are admissible to the Socially & Educationally Backward Classes of Odisha only.**
- (VIII) All persons appointed under the Government of Odisha on or after 1<sup>st</sup> 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.
- (IX) **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.**
- (X) 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.
- (XI) **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.**
- (XII) **No request for withdrawal of candidature and change of category will be entertained under any circumstances.**
- (XIII) **Submission of NPS application is mandatory for all recommended candidates at the time of joining in Govt. Services.**

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

Candidates, who qualify in the written examination will be provisionally called for document verification/Interview and 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 document **"Submitted by me and Certified as genuine and has not been cancelled"** and put their **full signature and date on the same.**

**If a candidate fails to produce any of the original certificates and documents in respect of self-attested photocopies submitted with the application during Document Verification, his/her candidature will be rejected.**

- (a) H.S.C. or equivalent certificate in support of declaration of age issued by the concerned Board/Council;
- (b) Degree in Mechanical Engineering or any qualification declared by the Union or State Public Service Commission as equivalent (as specified in Para-4-Note-1) thereto issued by a recognized University;

- (c) Mark-lists of all semesters / annual examination in support of all the aforesaid examinations (H.S.C. to Engineering Degree in Mechanical) passed including fail marks, if any, issued by the concerned Board/Council/University.

**NOTE-1:**

- (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.
- (ii) While filling up the relevant box of the online application form, the candidates has to mention the marks (Excepting the marks secured in the Extra-Optional / 4th Optional Subject) in the examinations passed (HSC to Degree).
- (d) Certificate showing **Practical experience of at least two-years** in a workshop or manufacturing concern of good standing or in design, construction, operation, or maintenance of boilers, after completion of Degree in Mechanical Engineering.
- (e) Caste Certificate in support of claim as S.E.B.C., wherever applicable (Please see Note-2-Para-11).
- (f) Required Odia Test Pass Certificate from the competent authority, wherever applicable (Please see Para-9(iii) & Note-3).
- (g) Ex-Servicemen are required to submit/upload Release Certificate issued as per Orissa Ex-Servicemen (Recruitment to State Civil Services & Posts) Rules, 1985 vide G.A. Deptt. Notification No. 22586-Gen, Dt-16.10.1985.
- (h) Four recent passport size photographs, within 06 months (unsigned & unattested), which has been uploaded with online application form.
- (i) **No Objection Certificate** from their competent authorities in case of Government Servants.
- (j) Proof of Identity i.e. Aadhar/EPIC/DL/Passport/PAN Card.

**NOTE -2:**

- i. **Candidates claiming to be belonging to S.E.B.C. categories of Odisha 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 21.03.2025; the SEBC certificate must have been issued on or after 22.03.2022. If such certificate is issued before 22.03.2022 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 categories are required to submit caste certificate 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:**

Degree Certificate in Mechanical Engineering, Practical Experience Certificate, SEBC Certificate, Odia Test Pass Certificate & Release Certificate issued as per Orissa Ex-Servicemen (Recruitment to State Civil Services & Posts) Rules, 1985 vide G.A. Deptt. Notification No. 22586-Gen, Dt-16.10.1985, must have been issued by the Competent Authority on or before the date of submission of the registered online application form by the candidate.

**12. GROUND 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 candidate not coming under para-3 of the Advertisement.
- (d) No required educational qualification as provided under Para-4 of the Advertisement.
- (e) Not furnishing copies of Certificates/documents etc. as provided under Para-11 of the Advertisement.
- (f) Odia Test not passed/Odia Test pass evidence not furnished, as required under Para-9(iii) of the Advertisement.
- (g) Submission of wrong information / false information/forged or manipulated certificates/testimonials with respect to qualification/Age/Category status (SEBC etc.)/Odia Test pass evidence etc.
- (h) Suppression of facts/information about eligibility, if any.
- (i) Any other grounds as per the decision of the Commission.

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



### 13. **HOW TO APPLY:**

- (a) **Candidate must go through the details of this Advertisement available on the Website of OPSC before filling up online application form.**
- (b) Candidates must apply online through the Website of the OPSC **<http://opsc.gov.in>**. **Applications received through any other mode would not be accepted and summarily be 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 and 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 their full signature and scanned 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 in the online application form for future use.
- (g) *On successful submission of the online application form, 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 Registration/ Re-registration and finally submitted online application forms and put his/her signature under the declaration for submission to OPSC along with copies of requisite certificate & 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 last hour rush.**
- (i) Admission Certificate to the eligible candidates will be uploaded in the Website of OPSC prior to the date of Written Examination. The date & programme of Written Examination will be published in the OPSC Website & in the Newspapers. The candidates are required to **download their Admission Certificate/Instruction to candidates from Website**. No separate correspondence will be made for this purpose.
- (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 must be sent to the Grievance wing of the Commission by e-mail ([opsc@nic.in](mailto:opsc@nic.in)) 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: -**

To resolve any technical problems faced during Registration and filling up of Online Application forms, candidate may contact OPSC Technical Support over Telephone No. 0671-2304707 between 10.30 A.M. to 1.30 P.M. & 2.00 P.M. to 5.30 P.M. of any Odisha Government working days.

In case of any guidance/information on this advertisement and recruitment, candidates may go through the **FAQ** available on the website of the Commission or contact the O.P.S.C. Facilitation Counter over Telephone No.0671-2304141/2305611 & Extn.-218 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 written examination, document verification & interview and also to keep track of publication of various notices to the effect in the leading local daily newspapers 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 DATES**

1. THE LINK FOR ONLINE APPLICATION AND SUBMISSION SHALL BE AVAILABLE ON THE WEBSITE FROM **16.04.2025 TO 15.05.2025 (11.59 P.M.)** (NOTE: - **15.05.2025** IS THE LAST DATE FOR SUBMISSION OF REGISTERED ONLINE APPLICATION FORM)
2. ONLY ONLINE APPLICATIONS RECEIVED WITHIN THE DEADLINE **15.05.2025 (11.59 P.M.)** SHALL BE ACCEPTED.

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

CUTTACK  
Dt. *10.04.25*

  
SECRETARY,  
ODISHA PUBLIC SERVICE COMMISSION

## Annexure-A

<u>Detailed Syllabus</u>	
<u>Paper-I</u> (General Studies and Mental Ability)	<ol style="list-style-type: none"><li>1. Events of National and International importance;</li><li>2. Current affairs - National and International;</li><li>3. General Science and its applications in day to day life, Contemporary developments in Science &amp; Technology and Information Technology, Environment Protection.</li><li>4. Economic and political history of modern India with emphasis on Odisha.</li><li>5. Indian Polity and Governance: Constitution of India, Panchayat Raj Institutions, e-governance initiatives with specific reference to Odisha.</li><li>6. Physical Geography of India with focus on Odisha;</li><li>7. Logical reasoning, analytical ability and data interpretation.</li><li>8. Data Analysis:<ol style="list-style-type: none"><li>a. Tabulation of data</li><li>b. Visual representation of data</li><li>c. Basic data analysis (Statistics such as mean, median, mode, variance and coefficient of variation) and Interpretation</li></ol></li><li>9. Basic knowledge on factories &amp; boilers and governing Acts / Rules.</li></ol>
<u>Paper-II</u> (Mechanical Engineering)	<p>(A). <u>Thermodynamics and Fluid Mechanics</u></p> <p>Thermodynamic processes, entropy, irreversibility and availability, basic thermodynamic cycles, behaviour of ideal and real gases, properties of pure substances, computation of work and heat, ideal processes, analysis of thermodynamic cycles related to energy conversion.</p> <p>Fluid mechanics: Fluid properties, fluid statics, manometry, buoyancy, control volume analysis of mass, momentum and energy, fluid acceleration, differential equations of continuity and momentum. Euler's equation, Bernoulli's equation, laminar flow through pipes, boundary layer displacement, momentum and energy thickness, flow through pipes, minor and major losses, dimensional analysis.</p> <p>Heat transfer: Modes of heat transfer, one dimensional heat conduction, thermal resistance, fins, free and forced convective heat transfer, dimensionless parameters, problems in convective heat transfer with the help of correlation, thermal boundary layer, radiation, black and grey surfaces, shape factors, network analysis</p> <p>(B). <u>Machine Design</u></p> <p>Mechanics of Solids: Stress-strain relationship and elastic constant, principal stress and strains. Mohr's circle for plane</p>

stresses and plane strains, shear force and bending moment diagrams, bending of beams, torsion of circular shafts. Euler's theory of columns, strain energy, thermal stresses.

Kinematic and dynamic analysis of planer mechanisms. Cams, Gears and gear trains. Fly wheels, Governors, Balancing of rigid rotors and field balancing. Balancing of single and multi-cylinder engines, free and forced vibrations of single degree of freedom systems, effect of damping, vibration isolation and transmissibility, resonance. Critical speeds and whirling of shafts.

Design for static and dynamic loading, failure theories, fatigue strength and S-N diagram, Principles of design or machine elements such as bolted, riveted and welded joints. Design of shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

#### (C). I.C. Engines and Refrigeration

SI and CI engines, two-stroke and four-stroke engines, efficiencies, heat balance, combustion in IC engines, abnormal combustion, engine fuels and fuel rating, alternate fuels, carburetion and fuel injection MPFI, CRDI, super charging and turbo charging methods, engine emission and control. Steam and gas turbines, Rankine and Brayton cycles with regeneration and reheat, heat transfer equation, heat exchangers - LMTD and NTU methods, vapour compression and absorption refrigeration cycles, heat pumps, properties of moist air, psychrometric chart, basic psychrometric processes, turbo machines - impulse and reaction principles. Pelton wheel, Francis and Kaplan turbines, velocity diagram and performance of turbo machines, non -conventional energy sources - solar, wind, wave, biomass. geothermal and fuel cells.

#### (D). Manufacturing Science and Processes

Classification of materials, Structure and properties of common engineering materials. Crystalline materials, crystal structure, defects in crystals, phase diagrams, iron- carbon equilibrium diagram, Phase transformation, T-T-T diagram, heat treatment. fracture - brittle and ductile materials, powder metallurgy.

Metal casting - sand casting, die casting, investment casting, centrifugal casting, gating and riser design, melting furnaces, forming - hot and cold processes, forging, drawing, extrusion, shearing, bending, high energy forming, joining processes - welding, weldability, metallurgy of welding, machining processes - single and multipoint cutting tools, tool geometry and materials, mechanics of machining. tool life and wear, jigs and fixtures, unconventional methods, EBM, ECM, LBM, ultrasonic machining, computer integrated manufacturing, CNC machining, metrology and instrumentation - limits, fits and tolerances.

accuracy, precision, repeatability, comparators, gauges, interferometry, surface structure, measurement of displacement, velocity, acceleration, temperature, Transducers.

(E). Power Plant Engineering

Boiler design engineering: Water tube boilers: Classification of boilers, fluidized bed, combustor boiler, circulating fluidized bed combustion boilers, waste heat boiler, chemical recovery boilers, cycles for steam power plants. Fire tube boilers: Shell type boilers, horizontal and vertical boilers.

Power Plants : Energy resources and their availability, types of power plants, selection of the plants, hydroelectric power plants, steam power plants, combined cycle power plants, nuclear power plants: principles of nuclear energy, basic nuclear reaction, nuclear reactor-PWR, BWR.

(F) Principles of Management

Principles and functions of scientific management, Levels and skills of management. organisational structure - authority, responsibility and span of control - system concept of management - line, line and staff, project and matrix organizations. Proprietary partnership and joint stock companies, private limited, public limited companies, cooperative organizations and Government organizations. Factors in selection of site, plant layout, types of layouts: process, product, fixed and group layouts. Marketing management - objectives and function, forecasting-moving average, exponential smoothing, break-even analysis, capacity planning, inventory control, ABC analysis, EOQ model. Work study - Job evaluation and merit rating. Quality control, control charts for variables and attributes, acceptance sampling, TQM, SPC tools, ISO standards, linear programming - Graphical and Simplex solution methods, Transportation and assignment models, single server queuing models, network theory - CPM, crashing of networks, PERT - probability of completion.”