# THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

## Ph. D. ENTRANCE TEST (PET) 2023

**Signature of Invigilator**

**Paper - II**
**Metallurgical and**
**Materials Engineering**

Roll. No.

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**Maximum Marks: 50**                                   **No. Of Printed Pages: 8**

**Instruction for the Candidate:**

1. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
2. There is no Negative Marking for Wrong Answer.
3. A separate OMR Answer Sheet has been provided to answer questions. Your answers will be evaluated based on your response in the OMR Sheet only. No credit will be given for any answering made in question booklet.
4. Defective question booklet or OMR if noticed may immediately replace by the concerned invigilator.
5. Write roll number, subject code, booklet type, category and other information correctly in the OMR Sheet else your OMR Sheet will not be evaluated by machine.
6. Select most appropriate answer to the question and darken appropriate oval on the OMR answer sheet, with black / blue ball pen only. DO NOT USE PENCIL for darkening. In case of over writing on any answer, the same will be treated as invalid. Each question has exactly one correct answer and has four alternative responses (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   **Example:** Ⓐ ⬤ Ⓒ Ⓓ where (B) is correct response.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. Calculators, Log tables any other calculating devices, mobiles, slide rule, text manuals etc are NOT allowed in the examination hall. If any of above is seized from the candidates during examination time; he/she will be immediately debarred from the examination and corresponding disciplinary action will be initiated by the Center Supervisor as deemed fit.
10. DO NOT FOLD or TEAR OMR Answer sheet as machine will not be able to recognize torn or folded OMR Answer sheet.
11. **You have to return the OMR Answer Sheet to the invigilator at the end of the examination compulsorily** and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet on conclusion of examination.

# Paper - II
## Metallurgical and Materials Engineering

**Note:** This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries **ONE (1)** mark.

| Q-1 | | One micron is equal to--------cm | | | |
|---|---|---|---|---|---|
| | A | $10^{-2}$ | B | $10^{-4}$ |
| | C | $10^{-6}$ | D | $10^{-8}$ |
| Q-2 | | In edge dislocation the direction of movement is | | | |
| | A | Parallel to the stress direction | B | Perpendicular to stress direction |
| | C | At $80^{o}$ to stress direction | D | None of these |
| Q-3 | | Dislocation density is defined as | | | |
| | A | Total dislocation per unit length | B | Total dislocation length per unit volume |
| | C | Total dislocation per unit area per unit time | D | None of these |
| Q-4 | | The range of dislocation density of heat treated deformed metal is | | | |
| | A | $10^{5}$- $10^{6}$ | B | $10^{8}$- $10^{9}$ |
| | C | $10^{11}$ -$10^{13}$ | D | $10^{13}$- $10^{15}$ |
| Q-5 | | If the grain diameter decreases then the yield strength of metal | | | |
| | A | Decreases | B | Increases |
| | C | Remains constant | D | None of these |
| Q-6 | | Brinell tester use a hardness steel ball of size | | | |
| | A | 1 mm | B | 5 mm |
| | C | 10 mm | D | 25 mm |
| Q-7 | | Charpy test is conducted to measure | | | |
| | A | Hardness | B | Fatigue resistance |
| | C | Brittleness | D | Malleability |
| Q-8 | | The temperature at which new grain are formed in the metal is known as | | | |
| | A | Upper critical temperature | B | Lower critical temperature |
| | C | Re-crystallization temperature | D | Eutectic temperature |
| Q-9 | | Which of the following gases are used in tungsten inert gas welding? | | | |
| | (A) | Hydrogen and oxygen | (B) | $CO_2$ and $H_2$ |
| | (C) | Argon and helium | (D) | Helium and neon |
| Q-10 | | In super plasticity the strain is | | | |
| | A | 100% uniform strain | B | 500% uniform strain |
| | C | 1000% uniform strain | D | 50% uniform strain |
| Q-11 | | What is the PH of distilled water? | | | |
| | (A) | 0 | (B) | 1 |
| | (C) | 7 | (D) | 14 |
| Q-12 | | Turbine rotor is made by | | | |
| | (A) | Rolling | (B) | Sand casting |
| | (C) | Forging | (D) | Extrusion |
| Q-13 | | For iron making in blast furnace the ore used is | | | |
| | (A) | Hematite | (B) | Magnetite |
| | (C) | Limonite | (D) | Siderites |
| Q-14 | | The composition of silver solder is | | | |
| | (A) | Silver, copper, zinc | (B) | Silver, lead, tin |
| | (C) | Silver, lead, zinc | (D) | Silver, tin, nickel |
| Q-15 | | Hardness of martensite is | | | |
| | (A) | RC-65 | (B) | RC-32 |
| | (C) | RC-80 | (D) | RC-48 |
| Q-16 | | Which is the chief alloying element in stainless steel which inhibits corrosion? | | | |
| | (A) | Chromium | (B) | Silicon |
| | (C) | Nickel | (D) | Carbon |

| Q-17 | Annealing can not | | | |
|------|-----------------|------|------|------|
| | (A) | Relieve internal stress | (B) | Improve wear resistance |
| | (C) | Improve machinability | (D) | Refine grain structure |
| Q-18 | Which alloying elements cannot impart high strength to steel at elevated temperature? | | | |
| | (A) | Nickel | (B) | Silicon |
| | (C) | Magnesium | (D) | Manganese |
| Q-19 | Which is the most suitable process for improving mechanical properties of steel casting ? | | | |
| | (A) | Hardening | (B) | Phase annealing |
| | (C) | Tempering | (D) | Recrystllization annealing |
| Q-20 | Eutectoid steel has a structure of | | | |
| | (A) | Pearlite | (B) | Martensite |
| | (C) | Sorbite | (D) | Ferrite |
| Q-21 | Wear resistance property of alloy steel is improved by the addition of | | | |
| | (A) | Nickel | (B) | Chromium |
| | (C) | Vanadium | (D) | Molybdenum |
| Q-22 | Presence of sulphur in pig iron makes it | | | |
| | (A) | Soft | (B) | Ductile |
| | (C) | Brittle | (D) | Hard |
| Q-23 | Blow holes in steel casting is not minimized by the addition of | | | |
| | (A) | Mg | (B) | Si |
| | (C) | Al | (D) | Ti |
| Q-24 | During nitriding process ----------gets  diffused in the surface layer of steel part. | | | |
| | (A) | Monoatomic nitrogen | (B) | Monoatomic chlorine |
| | (C) | Monoatomic oxygen | (D) | Monoatomic helium |
| Q-25 | Which of the following element is never used as an alloying element in steel? | | | |
| | (A) | Mo | (B) | W |
| | (C) | Pb | (D) | Mn |
| Q-26 | Which of the following is characterized as a light metal? | | | |
| | (A) | Li | (B) | Be |
| | (C) | B | (D) | Mg |
| Q-27 | Corrosion of metals cannot be reduce by its | | | |
| | (A) | Aluminizing | (B) | Galvanizing |
| | (C) | Alloying | (D) | Tempering |
| Q-28 | Bell less top (BLT) material charging system is employed in the | | | |
| | (A) | Sintering machine | (B) | L.D Converter |
| | (C) | Blast furnace | (D) | Cupola |
| Q-29 | The metal that can be extracted from sea water is ------- | | | |
| | (A) | Be | (B) | Ca |
| | (C) | Mg | (D) | Li |
| Q-30 | Blister copper is an --------of copper | | | |
| | (A) | Pure form | (B) | Ore |
| | (C) | Alloy | (D) | Impure form |
| Q-31 | Cold worked steel parts are normally subjected  to------- | | | |
| | (A) | annealing | (B) | Shot peening |
| | (C) | tempering | (D) | Quenching |
| Q-32 | The material for wire drawing should have high------- | | | |
| | (A) | Stiffness | (B) | Toughness |
| | (C) | Ductility | (D) | Hardness |
| Q-33 | Slow plastic deformation of metals under a constant stress is termed as the ------- | | | |
| | (A) | Rolling | (B) | Drawing |
| | (C) | Creep | (D) | Fatigue |
| Q-34 | Hammers and railways rail are normally made of ------ | | | |
| | (A) | Mild steel | (B) | Low alloy steel |
| | (C) | Medium alloy steel | (D) | High carbon steel |

| Q-35 | X-ray do not exhibit the property of------- | | |
|---|---|---|---|
| | (A) | reflection | (B) | Scattering |
| | (C) | diffraction | (D) | Dispersion |
| Q-36 | Transition temperature of metals is concerned with its -------properties. | | |
| | (A) | Creep | (B) | Fatigue |
| | (C) | Impact | (D) | Tensile |
| Q-37 | "W" filament are produce by -------technique. | | |
| | (A) | Die casting | (B) | Powder metallurgy |
| | (C) | Electro deposition | (D) | Forging |
| Q-38 | The driving force for sintering of powder compact is depends on ------- | | |
| | (A) | Strain energy | (B) | Surface energy |
| | (C) | Volume energy | (D) | Stacking fault energy |
| Q-39 | The engineering stress-strain curve for a ceramic material is ------ | | |
| | (A) | Parabolic | (B) | Exponential |
| | (C) | Logarithmic | (D) | Linear |
| Q-40 | Which is not agglomeration process? | | |
| | (A) | Nodulizing | (B) | Briquetting |
| | (C) | Roasting | (D) | Pelletizing |
| Q-41 | Which one of the following can give information about the corrosion rate? | | |
| | (A) | Pourbaix diagram | (B) | Polarization technique |
| | (C) | EMF series | (D) | Galvanic series |
| Q-42 | Mesh number indicates the number of holes per | | |
| | (A) | Square inch | (B) | Linear inch |
| | (C) | Per unit volume | (D) | Per unit area |
| Q-43 | In froth floating ,chemical agent added to cause air adherence is called the | | |
| | (A) | Collector | (B) | Frother |
| | (C) | Modifier | (D) | Activator |
| Q-44 | The process opposite to dispersion is termed as the | | |
| | (A) | flocculation | (B) | Sedimentation |
| | (C) | Filtration | (D) | Gigging |
| Q-45 | Most of the phosphorus present in the blast furnace burden enters into | | |
| | (A) | Hot metal | (B) | Flue gases |
| | (C) | Slag | (D) | Refractory lining |
| Q-46 | In continuous casting of liquid steel the mould is made of-- | | |
| | (A) | Water cooled steel | (B) | Water cooled copper |
| | (C) | Refractory oxide | (D) | Silicon carbide |
| Q-47 | Purity of electrical grade aluminium should be greater than ---------% | | |
| | (A) | 88 | (B) | 89 |
| | (C) | 98 | (D) | 99 |
| Q-48 | Which metal is extracted by leaching? | | |
| | (A) | Fe | (B) | Al |
| | (C) | Pb | (D) | Au |
| Q-49 | Wrought iron is--- | | |
| | (A) | High carbon iron | (B) | Highly resistant to corrosion |
| | (C) | Malleable and ductile | (D) | Light in weight |
| Q-50 | Cast iron has high -------strength | | |
| | (A) | Tensile | (B) | Compressive |
| | (C) | Shear | (D) | Fatigue |

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**Rough Work:**