



रेलवे भर्ती बोर्ड / RAILWAY RECRUITMENT BOARDS
सीईएन - 05/25 - जेई, डीएमएस, सीएमए - CEN - 05/25 - JE, DMS, CMA



Test Date	02/07/2026
Test Time	9:00 AM - 11:00 AM
Subject / Exam Group	RRB JE Stage 2 Mechanical and Allied Engineering

* Note
Correct Answer will carry 1 mark per Question.
Incorrect Answer will carry 1/3 Negative mark per Question.

1. Options shown in green color with a tick icon are correct.
2. Chosen option on the right of the question indicates the option selected by the candidate.

Section : General Abilities

Q.1	If 10 grams of salt are dissolved in 100 mL of water, which component is the solute?
Ans	☒ 1. Both salt and water ☒ 2. Salt only ☒ 3. Neither ☒ 4. Water only
Q.2	Which of the following indicators is NOT typically used to measure sustainable development?
Ans	☒ 1. Biocapacity ☒ 2. Gross Domestic Product (GDP) growth rate ☒ 3. Human Development Index (HDI) ☒ 4. Ecological Footprint
Q.3	A field exposed to excessive pesticide use shows a sharp decline in earthworm population. The resulting effect on soil is:
Ans	☒ 1. Reduced soil fertility ☒ 2. Enhanced decomposition ☒ 3. Improved aeration ☒ 4. Increased water retention
Q.4	The term 'smog' is a combination of _____.
Ans	☒ 1. Smog and mist ☒ 2. Smoke and haze ☒ 3. Fog and clouds ☒ 4. Smoke and fog
Q.5	Biomedical waste handlers in a hospital are at risk of occupational hazards. The most effective way to protect them from exposure to infectious materials is:
Ans	☒ 1. Use of protective equipment and safe handling ☒ 2. Segregation of waste into color-coded bins ☒ 3. Vaccination against common infections ☒ 4. Regular medical check-ups

Q.6	Which new warship was commissioned by the Indian Navy in November, 2025, to strengthen anti-submarine and coastal defence capabilities?
Ans	✖ 1. INS Ikshak ✔ 2. INS Mahe ✖ 3. INS Vikrant ✖ 4. INS Arnala
Q.7	Which condition is required for a displacement reaction between a metal and salt solution?
Ans	✖ 1. Salt must be insoluble in water ✖ 2. Metal must be same as salt constituent ✔ 3. Metal must be higher in reactivity series ✖ 4. Reaction must be endothermic
Q.8	The primary method of managing biodegradable domestic waste after collection is _____.
Ans	✔ 1. conversion into compost ✖ 2. sending for recycling ✖ 3. throwing into sewers ✖ 4. burnt in open air
Q.9	A student pushes a heavy box that is already moving across a rough floor. If the force applied by the student is exactly equal to the frictional force opposing the motion, what will happen to the box?
Ans	✖ 1. The box will gradually come to rest ✖ 2. The box will move at increasing speed ✖ 3. The box will accelerate forward ✔ 4. The box will move at a constant speed
Q.10	Which of the following satellites was launched on November 2, 2025, to enhance the Indian Navy's secure communication network and maritime surveillance capabilities?
Ans	✖ 1. RISAT-2B ✖ 2. GSAT-6A ✔ 3. CMS-03 (GSAT-7R) ✖ 4. Cartosat-3
Q.11	What is the general formula of alkenes?
Ans	✖ 1. C_nH_{2n-2} ✔ 2. C_nH_{2n} ✖ 3. C_nH_n ✖ 4. C_nH_{2n+2}
Q.12	A student accidentally spills some hydrochloric acid on a table. Which substance should be used to neutralise the acid safely?
Ans	✔ 1. Baking soda solution ✖ 2. Lemon juice ✖ 3. Vinegar ✖ 4. Sugar solution

Q.13 The Atal Bhujal Yojana 2020 focused on improving water resources management of how many states?

Ans ☒ 1. seven

☐ 2. ten

☐ 3. five

☐ 4. eight

Q.14 Which of the following statements best describes the behavior of magnetic field lines around a straight current-carrying conductor?

Ans ☒ 1. They form concentric circles centered on the conductor.

☐ 2. They are parallel straight lines along the wire.

☐ 3. They change direction randomly along the wire.

☐ 4. They radiate straight outward from the wire.

Q.15 Who won the maximum number of medals at the 38th National Games of India?

Ans ☒ 1. Dhinidhi Desinghu

☐ 2. Manu Bhaker

☐ 3. Neeraj Chopra

☐ 4. Bajrang Punia

Q.16 The Kol Rebellion (1831–32) mainly affected which plateau region?

Ans ☐ 1. Malwa Plateau

☒ 2. Chotanagpur Plateau

☐ 3. Deccan Plateau

☐ 4. Meghalaya Plateau

Q.17 Which of the following statements best describes how the power of accommodation enables the human eye to focus on both near and distant objects?

Ans ☐ 1. The cornea provides all the focusing power required for clear vision

☐ 2. The iris controls the amount of light entering and helps to focus

☐ 3. The retina moves forward and backward to adjust the focus

☒ 4. The eye lens changes its focal length by altering its shape through ciliary muscle action

Q.18 Which function returns the smallest value?

Ans ☐ 1. AVERAGE

☒ 2. MIN()

☐ 3. MAX()

☐ 4. COUNT()

Q.19 Which of the following is a primary mission under India's National Action Plan on Climate Change (NAPCC)?

Ans ☐ 1. National Nutrition Mission

☐ 2. National Highway Development Project

☐ 3. National Rural Livelihood Mission

☒ 4. National Solar Mission

Q.20 When was the 11th National Handloom Day celebrated across India under the coordination of the Ministry of Textiles?

Ans ☒ 1. August 7, 2025

☐ 2. September 7, 2025

☐ 3. November 7, 2025

☐ 4. October 7, 2025

Q.21 Which Quick Style type is applied only to selected words or individual characters within a paragraph in MS Word 2010?

- Ans
- ☐ 1. Page styles
 - ☐ 2. Paragraph styles
 - ☒ 3. Character styles
 - ☐ 4. Linked styles

Q.22 Which of the following Articles states about the right of individual to form associations or unions or co-operative societies?

- Ans
- ☒ 1. Article 19 (1) (c)
 - ☐ 2. Article 19 (1) (a)
 - ☐ 3. Article 19 (1) (d)
 - ☐ 4. Article 19 (1) (b)

Q.23 You want to automatically advance slides with narration and animations during a presentation. Which MS PowerPoint feature should you use to achieve this?

- Ans
- ☐ 1. Slide Sorter
 - ☒ 2. Rehearse Timings
 - ☐ 3. Presenter View
 - ☐ 4. Action Buttons

Q.24 Consider the following statements regarding chemical reactions and choose the correct option.

Statement I: Every reaction in which two or more reactants combine to form a single product is classified as a combination reaction regardless of heat change.
Statement II: The reaction $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{heat}$ is both a combination reaction and an exothermic reaction.

- Ans
- ☐ 1. Both statements are incorrect
 - ☒ 2. Both statements are correct
 - ☐ 3. Only Statement I is correct
 - ☐ 4. Only Statement II is correct

Q.25 The primary goal of the Pradhan Mantri Gram Sadak Yojana (PMGSY) is to:

- Ans
- ☐ 1. Develop urban infrastructure
 - ☐ 2. Promote renewable energy usage
 - ☐ 3. Enhance telecommunication services in cities
 - ☒ 4. Provide rural connectivity through road construction

Q.26 How can we locate a file with a known extension but an unknown name in a large directory?

- Ans
- ☐ 1. Checking the Recycle Bin
 - ☐ 2. Using the dir command
 - ☐ 3. Through File Explorer
 - ☒ 4. Using the Search box in File Explorer with *.ext

Q.27 What is the main reason sulfur dioxide irritates the upper respiratory mucous membrane?

- Ans
- ☐ 1. It combines with haemoglobin and effect the oxygen transport
 - ☐ 2. It oxidizes to sulphur trioxide and inhaled deep into lung
 - ☒ 3. It dissolves in moisture in upper respiratory tract and forms irritant
 - ☐ 4. It combines with other pollutants and polymerizes in the lungs

Q.28 According to Thomson's model, how are electrons arranged in an atom?

- Ans
- ✗ 1. Moving in fixed orbits around the nucleus
 - ✓ 2. Embedded in a positively charged sphere like seeds in a watermelon
 - ✗ 3. Orbiting around neutrons in elliptical paths
 - ✗ 4. Randomly placed inside the nucleus

Q.29 If cell A1 = 10 and B1 = 20, what will `=A1+B1` return?

- Ans
- ✗ 1. Error
 - ✗ 2. 1020
 - ✗ 3. 200
 - ✓ 4. 30

Q.30 The pollutant group commonly associated with oil spills in oceans is _____.

- Ans
- ✗ 1. synthetic detergents
 - ✗ 2. agricultural pesticides
 - ✓ 3. petroleum products
 - ✗ 4. chemical fertilizers

Q.31 Match the following columns.

Pardoning power	Function
1. Commutation	a. Removes both sentence and the conviction.
2. Reprieve	b. Lesser sentence than originally given, in special cases.
3. Respite	c. Reducing the period of sentence without changing the nature of the sentence.
4. Remission	d. Temporary stay on the execution of a sentence.
5. Pardon	e. Substitution of one form of punishment to a lighter one.

- Ans
- ✗ 1. 1-d, 2-b, 3-e, 4-c, 5-a
 - ✓ 2. 1-e, 2-d, 3-b, 4-c, 5-a
 - ✗ 3. 1-a, 2-c, 3-d, 4-e, 5-b
 - ✗ 4. 1-c, 2-e, 3-b, 4-a, 5-d

Q.32 Which of the following best describes how sound travels through air?

- Ans
- ✗ 1. The air particles vibrate up and down perpendicular to the direction of the wave
 - ✗ 2. The air particles move in circular paths as the wave passes
 - ✗ 3. The air particles remain stationary while the wave moves through
 - ✓ 4. The air particles vibrate back and forth parallel to the direction of the wave

Q.33 According to the Article 75 of the Indian Constitution, the total number of ministers (including the Prime Minister) in the Council of Ministers shall NOT exceed what percentage of the total members of the House of the People, i.e., Lok Sabha?

- Ans
- ✓ 1. 15%
 - ✗ 2. 20%
 - ✗ 3. 25%
 - ✗ 4. 10%

Q.34 The atmospheric component that remains largely unreactive is _____.

- Ans
- ✗ 1. Carbon dioxide
 - ✗ 2. Methane
 - ✓ 3. Argon
 - ✗ 4. Oxygen

Q.35 Which experimental discovery contradicted Thomson's model of the atom and led to its rejection?

- Ans**
- ☐ 1. Observation of line spectra of hydrogen by Bohr
 - ☐ 2. Measurement of atomic radius using X-ray diffraction
 - ☐ 3. Discovery of the neutron by James Chadwick
 - ☒ 4. Alpha particle scattering showing deflection at large angles

Q.36 Which of the following is/are the primary reasons to fall in the trap of Email fraud or phishing?

- A) Paying attention to lucrative offers.
B) Not checking on links or attachments from unknown senders
C) Providing official information via email
D) Paying attention to the company logo sent in the email

- Ans**
- ☐ 1. A, B, D Only
 - ☐ 2. A only
 - ☒ 3. A, B, C Only
 - ☐ 4. A, B Only

Q.37 A construction worker needs to lift a heavy metal beam using a lever but has a limited length of plank. Which adjustment would allow the worker to lift the beam with the least effort if the position of the fulcrum can be changed but the plank length remains constant?

- Ans**
- ☐ 1. Place the fulcrum at the center of the plank
 - ☐ 2. Keep the fulcrum fixed at any point
 - ☐ 3. Move the fulcrum closer to the worker
 - ☒ 4. Move the fulcrum closer to the beam

Q.38 Which type of computer virus attaches itself to executable files and gets activated when the file is run?

- Ans**
- ☒ 1. File Infector Virus
 - ☐ 2. Boot Sector Virus
 - ☐ 3. Macro Virus
 - ☐ 4. Worm

Q.39 What file extension is used to save an MS PowerPoint 2021 presentation?

- Ans**
- ☐ 1. .pdf
 - ☐ 2. .docx
 - ☐ 3. .xlsx
 - ☒ 4. .pptx

Q.40 On which date is National Handloom Day observed in India?

- Ans**
- ☒ 1. 7 August
 - ☐ 2. 5 September
 - ☐ 3. 2 October
 - ☐ 4. 18 August

Q.41 Which of the following options must be DISABLED before manually setting the date and time in Windows?

- Ans**
- ☐ 1. Night Light
 - ☐ 2. Enable multiple clocks
 - ☒ 3. Set time automatically
 - ☐ 4. Set time zone globally

Q.42	Which pair of sectors is commonly addressed together in State Action Plan on Climate Change (SAPCC) adaptation planning?
Ans	✓ 1. Water resources and health systems ✗ 2. Textile design and fashion marketing ✗ 3. Information technology and space research ✗ 4. Heavy industry and entertainment
Q.43	A factory plans to install a powerful electromagnet for lifting metal scraps. To maximize the magnetic field strength around the coil, which of the following combinations would be most effective?
Ans	✓ 1. Using a soft iron core, increasing coil turns, and increasing current through the coil ✗ 2. Using a steel core, decreasing coil turns, and lowering current ✗ 3. Using an air core, decreasing coil turns, and keeping current constant ✗ 4. Using a copper core, increasing coil turns, and lowering current
Q.44	Which of the following rivers forms a delta along the eastern coastal plains?
Ans	✗ 1. Tapi ✗ 2. Narmada ✗ 3. Ganga ✓ 4. Godavari
Q.45	The Mappila Uprisings of the 19 th century occurred mainly in which region of India?
Ans	✗ 1. Konkan region of Maharashtra ✗ 2. Sunderbans region of West Bengal ✓ 3. Malabar region of Kerala ✗ 4. Coromandel Coast of Tamil Nadu
Q.46	In a real-life scenario, a chemist discovers a compound with the formula $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$. What is the correct IUPAC name for this compound?
Ans	✗ 1. 3-methylhexanol ✓ 2. 3-methylpentan-1-ol ✗ 3. 2-methylhexanol ✗ 4. 4-methylpentanol
Q.47	Which British colonial building in Mumbai, completed in 1888, showcases a blend of Victorian Gothic and Indian architectural elements?
Ans	✗ 1. Rajabai Clock Tower ✗ 2. Bombay Town Hall ✓ 3. Chhatrapati Shivaji Maharaj Terminus ✗ 4. Gateway of India
Q.48	A farmer applies large amounts of chemical fertilizers over several years. Which consequence most likely results from this practice leading to soil pollution?
Ans	✗ 1. Erosion of surface soil layers ✓ 2. Accumulation of toxic substances in soil ✗ 3. Increase in earthworm population ✗ 4. Faster plant growth every season

Q.49 Which of the following best describes the velocity-time graph for an object moving with uniform velocity?

- Ans
- ☐ 1. A straight line sloping upwards from the time axis
 - ☐ 2. A line starting from the origin and sloping upwards
 - ☒ 3. A straight horizontal line parallel to the time axis
 - ☐ 4. A curved line above the time axis

Q.50 Which of the following statements is true about the Outbox?

- Ans
- ☐ 1. It is used to receive incoming emails.
 - ☒ 2. It temporarily stores emails that are queued for sending.
 - ☐ 3. It contains emails that are currently being drafted.
 - ☐ 4. It holds emails that have been successfully sent.

Section : Technical Abilities

Q.1 A hollow shaft is designed to transmit a torque of 40000 N-m. The polar moment of inertia (J) is 0.004 m⁴. The ratio of inside diameter to outside diameter of the hollow shaft (D_i/D_o) is 0.8. The inside diameter is 400 mm. What is the maximum induced shear stress (τ_{max}) at the outer fiber of the shaft?

- Ans
- ☐ 1. 2500 MPa
 - ☒ 2. 2.5 MPa
 - ☐ 3. 250 MPa
 - ☐ 4. 0.25 MPa

Q.2 In a scenario where excessive spatter occurs during arc welding, which adjustment is most likely to mitigate the issue without compromising weld quality?

- Ans
- ☐ 1. Switching to a larger electrode
 - ☒ 2. Reducing arc length slightly
 - ☐ 3. Decreasing base metal thickness
 - ☐ 4. Increasing travel speed marginally

Q.3 A mechanical engineer needs to choose a steel for a structural component that requires moderate ductility and high weldability. Based on the chemical composition and classification, which steel type should be recommended?

- Ans
- ☒ 1. Mild steel with low carbon and minimal alloying elements
 - ☐ 2. Alloy steel with high chromium and nickel content
 - ☐ 3. Alloy steel with high manganese and vanadium content
 - ☐ 4. Mild steel with increased silicon and phosphorus content

Q.4 The ideal gas law for isothermal process can be represented as _____, (P is the pressure and V is the volume of the gas at any stage).

- Ans
- ☐ 1. P = constant.
 - ☒ 2. PV = Constant.
 - ☐ 3. V = constant.
 - ☐ 4. P/V = Constant.

Q.5 Which two types of thermodynamic processes constitute the Carnot cycle in an ideal heat engine?

- Ans
- ☐ 1. Adiabatic and isochoric
 - ☒ 2. Isothermal and adiabatic
 - ☐ 3. Isothermal and isochoric
 - ☐ 4. Isobaric and isochoric

Q.6	Which property of rubber-based coatings makes them suitable for protecting steel pipes in industrial environments?
Ans	☐ 1. The coating improves the electrical conductivity of the pipe surface ☐ 2. The coating provides high levels of thermal conductivity for the pipes ☒ 3. The coating's flexibility prevents cracking under vibration and resists chemical attack ☐ 4. The coating's color remains durable even with prolonged sunlight exposure
Q.7	Intensity of pressure at a point in a fluid is:
Ans	☐ 1. Pressure includes both normal and shear stresses acting simultaneously at a point ☐ 2. Total normal force acting uniformly over a surface, independent of area and location within the fluid ☐ 3. Pressure at a point varies significantly with direction even in a static fluid ☒ 4. Normal force per unit area at a point in the fluid, scalar intensity independent of direction
Q.8	Why is water mixed with oil often preferred as a grinding coolant over plain water?
Ans	☒ 1. It provides both cooling and lubrication ☐ 2. It increases corrosion of metals ☐ 3. It makes coolant less effective ☐ 4. It decreases grinding time significantly
Q.9	The primary function of a sine bar is to:
Ans	☐ 1. calibrate pressure gauges ☐ 2. check thread pitches ☒ 3. measure angles with high accuracy ☐ 4. measure linear dimensions
Q.10	Which of the following is a necessary modification in Newton's second law to derive D'Alembert's principle for a dynamic system?
Ans	☒ 1. Incorporate a fictitious force equal to "minus mass times acceleration" ☐ 2. Omit all resistive forces acting on the system ☐ 3. Replace all forces with their average values ☐ 4. Include only gravitational forces in the analysis
Q.11	During the 'Shaping' operation conducted on a workpiece of aluminum material, the type of coolant used is:
Ans	☒ 1. kerosene ☐ 2. cutting compound ☐ 3. mineral hard oil ☐ 4. dry kerosene turpentine
Q.12	During oxy-acetylene gas welding, improper adjustment of the neutral flame can most likely result in which weld defect on stainless steel?
Ans	☐ 1. Occurrence of incomplete root fusion in the joint ☐ 2. Formation of significant undercut along the joint ☐ 3. Development of porosity within the weld metal ☒ 4. Excessive oxidation at the weld bead surface
Q.13	What is the heat supplied to a Carnot engine that produces 100 kW of useful work at an efficiency of 35%?
Ans	☐ 1. 300 kW ☐ 2. 150 kW ☐ 3. 200 kW ☒ 4. 285.7 kW

Q.14 Which of the following properties is used as the basis for temperature measurement in constant volume thermometers?

- Ans**
- ✓ 1. Pressure
 - ✗ 2. Volume
 - ✗ 3. Entropy
 - ✗ 4. Enthalpy

Q.15 Which material handling equipment would be most suitable for transferring bulk granular materials over a long horizontal distance within a factory?

- Ans**
- ✗ 1. Forklift transportation
 - ✗ 2. Overhead crane arrangement
 - ✓ 3. Belt conveyor system
 - ✗ 4. Pallet truck operation

Q.16 Which of the following is considered a common surface defect in welding processes?

- Ans**
- ✓ 1. Undercut along the weld bead
 - ✗ 2. Excessive spatter deposits
 - ✗ 3. Lamellar tearing in plate
 - ✗ 4. Incomplete penetration at root

Q.17 What type of measurement does a 'comparator' work on?

- Ans**
- ✗ 1. Absolute measurement
 - ✗ 2. Basic measurement
 - ✗ 3. Direct measurement
 - ✓ 4. Relative measurement

Q.18 A component in a high-impact environment requires resistance to fracture with minimal deformation. Which material property would be most critical to avoid premature failure?

- Ans**
- ✗ 1. High brittleness with low ductility
 - ✓ 2. Low brittleness with high toughness
 - ✗ 3. High brittleness with high elasticity
 - ✗ 4. Low brittleness with low stiffness

Q.19 In high-performance applications such as turbine shafts and precision gears, alloy steels are favored over mild steels primarily because they:

- Ans**
- ✗ 1. Require less alloying and heat treatment to achieve desired strength
 - ✗ 2. Exhibit superior machinability due to refined ferritic microstructure
 - ✗ 3. Possess lower density and improved dimensional stability
 - ✓ 4. Retain mechanical integrity and hardness under conditions of elevated temperature and cyclic stress

Q.20 Which type of flux is most suitable for minimizing oxidation in high-temperature aluminum welding applications involving magnesium alloys?

- Ans**
- ✓ 1. Fluoride-based flux
 - ✗ 2. Borax-based flux
 - ✗ 3. Zinc chloride-based flux
 - ✗ 4. Rosin-based flux

Q.21 Which of the following is a limitation of conventional oxy-fuel gas cutting?

- Ans**
- ✓ 1. Cannot cut stainless steel efficiently
 - ✗ 2. Cannot cut mild steel plates
 - ✗ 3. Cannot cut thick carbon steels
 - ✗ 4. Requires electrical input for operation

Q.22 A technician wants to improve flatness and surface quality of a gauge block using lapping. What is the most important factor to control?

- Ans**
- ☐ 1. Applying excessive force to speed up lapping
 - ☐ 2. Using coarse abrasives for faster removal
 - ☒ 3. Uniform pressure and movement across the surface
 - ☐ 4. High temperature and fast lap speed

Q.23 Which type of friction occurs when surfaces are lubricated with a fluid?

- Ans**
- ☐ 1. Rolling friction
 - ☒ 2. Film friction
 - ☐ 3. Dry friction
 - ☐ 4. Static friction

Q.24 In ABC analysis, the letter 'C' is designated to:

- Ans**
- ☐ 1. high valued items, smaller in number
 - ☐ 2. high valued items, larger in number
 - ☐ 3. low valued items, smaller in number
 - ☒ 4. low valued items, larger in number

Q.25 Which of the following best describes the principle of parkerising?

- Ans**
- ☒ 1. A phosphate layer forms by chemical reaction
 - ☐ 2. A paint coating is applied to the surface
 - ☐ 3. A polymer coating is sprayed on the surface
 - ☐ 4. Surface roughness is increased mechanically

Q.26 Which component is essential in a profile projection method for accurately displaying the outline of a machine part?

- Ans**
- ☒ 1. Collimated light source with precise screen alignment
 - ☐ 2. Simple lamp with diffused translucent screen
 - ☐ 3. Curved screen with angled light projection
 - ☐ 4. Non-reflective surface with ambient room lighting

Q.27 The lathe bed is designed with which type of guideways?

- Ans**
- ☐ 1. Circular
 - ☐ 2. Rectangular
 - ☐ 3. Triangular
 - ☒ 4. Inverted V and flat combination

Q.28 The functioning of a comparator is based on:

- Ans**
- ☐ 1. The use of limit gauges
 - ☐ 2. An optical measuring system
 - ☐ 3. The use of an accurately calibrated scale
 - ☒ 4. Comparison with a known standard, such as slip gauges

Q.29 For shafts designed to transmit the same torque, which statement is generally true when comparing a solid shaft to a hollow shaft of the same material and outer diameter?

- Ans**
- ☐ 1. The hollow shaft has a lower torsional stiffness but lower weight.
 - ☐ 2. The hollow shaft has a higher torsional stiffness and higher weight.
 - ☒ 3. The solid shaft has a higher torsional stiffness and lower weight.
 - ☐ 4. Both shafts have equal torsional stiffness and equal weight.

Q.30 The shape of the bending moment diagram for a cantilever beam subjected to a uniformly distributed load (UDL) over the whole length is ____.

- Ans**
- ☐ 1. Rectangular
 - ☐ 2. Triangular
 - ☐ 3. Trapezoidal
 - ☒ 4. Parabolic

Q.31 What type of efficiency is most important for an axial flow compressor in high-speed applications?

- Ans**
- ☐ 1. Volumetric efficiency
 - ☒ 2. Isentropic efficiency
 - ☐ 3. Thermal efficiency
 - ☐ 4. Mechanical efficiency

Q.32 Water as a cutting fluid does NOT spread well over a surface to wet it because of ____.

- Ans**
- ☐ 1. low surface tension
 - ☐ 2. high buoyancy force
 - ☐ 3. high volatility
 - ☒ 4. high surface tension

Q.33 Determine the gauge pressure given an absolute pressure of 2 atm and atmospheric pressure of 1 atm.

- Ans**
- ☐ 1. 2 atm
 - ☒ 2. 1 atm
 - ☐ 3. 3 atm
 - ☐ 4. 0.5 atm

Q.34 Radial flow pumps are preferred when:

- Ans**
- ☐ 1. Flow is very viscous
 - ☐ 2. Only low suction head is available
 - ☐ 3. High flow, low head is required
 - ☒ 4. Low flow, high head is required

Q.35 For a simply supported beam with multiple point loads, maximum bending moment occurs where:

- Ans**
- ☐ 1. Reaction = 0
 - ☐ 2. Load = 0
 - ☐ 3. Deflection = 0
 - ☒ 4. Shear force = 0

Q.36 The area under load v/s elongation diagram for a ductile material upto fracture indicates ____.

- Ans**
- ☐ 1. Resilience
 - ☐ 2. Modulus of toughness
 - ☐ 3. Modulus of resilience
 - ☒ 4. Toughness

Q.37 Why does the vapor pressure of a liquid increase with an increase in temperature?

- Ans**
- ☒ 1. Molecules gain kinetic energy to escape into vapor
 - ☐ 2. Surface tension remains constant
 - ☐ 3. Viscosity reduces exponentially
 - ☐ 4. Density reduces in a straight-line manner

Q.38 A synthetic oil is contained in an accelerating elevator moving upward with acceleration (a). If the pressure intensity at the free surface is atmospheric, the intensity of pressure at a depth (h) below the surface is [take (g) as the acceleration due to gravity]:

- Ans
- ☐ 1. $P_{atm} - \rho gh$
 - ☐ 2. $P_{atm} - \rho(g-a)h$
 - ☒ 3. $P_{atm} + \rho(g+a)h$
 - ☐ 4. $P_{atm} + \rho gh$

Q.39 Which of the following is a primary application of interferometry in metrology?

- Ans
- ☐ 1. Analyzing thermal conductivity of metals
 - ☒ 2. Measuring surface flatness with high precision
 - ☐ 3. Determining chemical composition by spectroscopy
 - ☐ 4. Calculating torque in shafts using sensors

Q.40 Which defect results from improper shielding during the welding process and causes gas pockets in the weld?

- Ans
- ☐ 1. Slag inclusion
 - ☐ 2. Undercut
 - ☐ 3. Lack of fusion
 - ☒ 4. Porosity

Q.41 What is the typical least count of a bevel protractor with a vernier scale?

- Ans
- ☐ 1. 1°
 - ☐ 2. 0.1°
 - ☐ 3. 10 minutes
 - ☒ 4. 5 minutes

Q.42 A cylindrical steel rod with a diameter of 20 mm is subjected to a tensile load of 40 kN. The material has a yield strength of 450 MPa. Assuming the deformation remains within the elastic limit, calculate the factor of safety based on the ultimate tensile strength and the yield strength. If the modulus of elasticity of the steel is 200 GPa, determine the elongation of the rod over a length of 500 mm under this load. Which of the following options correctly represents the factor of safety based on yield strength and the elongation?

- Ans
- ☐ 1. Factor of Safety (Yield) = 3.58, Elongation = 0.8 mm
 - ☒ 2. Factor of Safety (Yield) = 3.58, Elongation = 0.318 mm
 - ☐ 3. Factor of Safety (Yield) = 2.25, Elongation = 0.5 mm
 - ☐ 4. Factor of Safety (Yield) = 2.25, Elongation = 0.318 mm

Q.43 Which manufacturing method is primarily used to harden and set silicate-bonded grinding wheels?

- Ans
- ☐ 1. High-pressure forging of abrasive particles
 - ☐ 2. Low-temperature drying without firing
 - ☒ 3. Controlled firing at moderate temperature
 - ☐ 4. Chemical polymerization at room temperature

Q.44 When selecting a material for a component subjected to cyclic loading and impact, which mechanical property should be prioritized along with hardness?

- Ans
- ☐ 1. Plasticity must be considered to increase mass
 - ☐ 2. Ductility must be considered to avoid oxidation
 - ☒ 3. Toughness must be considered to resist sudden failure
 - ☐ 4. Elasticity must be considered for better insulation

Q.45	Which of the following is an example of a positive displacement air compressor?
Ans	☐ 1. Centrifugal compressor ☐ 2. Radial dynamic compressor ☐ 3. Axial flow compressor ☒ 4. Reciprocating piston compressor
Q.46	A force of 10 N acts along a line OB, which makes an angle of 60° with the horizontal line OA. What is the component of the force along the direction of the acute angle bisector of angle ∠AOB?
Ans	☐ 1. $10 \sin 30^\circ$ N ☐ 2. 10 N ☐ 3. $10 \cos 60^\circ$ N ☒ 4. $10 \cos 30^\circ$ N
Q.47	Which of the following best describes the purpose of ABC analysis in inventory management?
Ans	☒ 1. To categorize inventory items based on significance in value and usage frequency ☐ 2. To group inventory items based on supplier location and delivery schedule ☐ 3. To organize inventory items solely by their production shelf life in warehouse ☐ 4. To store inventory items according to their physical characteristics in the warehouse
Q.48	When a mild steel bar is loaded in tension within the elastic limit, the relation between stress and strain is:
Ans	☐ 1. $\text{Stress} \propto (\text{Strain})^2$ ☐ 2. $\text{Stress} \propto \sqrt{(\text{Strain})}$ ☐ 3. Stress independent of strain ☒ 4. $\text{Stress} \propto \text{Strain}$
Q.49	If a block slides down a rough plane inclined at 30° with a coefficient of friction of 0.2, the net acceleration is:
Ans	☒ 1. 0.326 g ☐ 2. 0.676 g ☐ 3. Zero ☐ 4. 0.5 g
Q.50	The horizontal and vertical components of a 100 N force inclined at 37° with the horizontal are: (consider the approximation of $\sin 37^\circ=0.6$, $\cos 37^\circ=0.8$ and $\tan 37^\circ=0.75$)
Ans	☒ 1. 80 N and 60 N ☐ 2. 60 N and 80 N ☐ 3. 100 N and 0 N ☐ 4. 70 N and 70 N
Q.51	An LVDT (Linear Variable Differential Transformer) is primarily used in which type of comparator?
Ans	☒ 1. Electrical comparator ☐ 2. Mechanical comparator ☐ 3. Optical comparator ☐ 4. Pneumatic comparator

Q.52	A force of 100 N acting on a rigid body is moved to another point along the same line of action. What is the effect on the external equilibrium of the body?
Ans	☐ 1. The external equilibrium changes ☐ 2. The effect depends on the material ☐ 3. The force magnitude becomes zero ☒ 4. The external equilibrium remains unchanged
Q.53	Trackless cranes are mainly used for:
Ans	☒ 1. Lifting loads in confined or uneven areas ☐ 2. Operations limited to fixed tracks ☐ 3. Handling liquid materials only ☐ 4. Continuous material transport
Q.54	Which characteristic best describes the arc in submerged arc welding?
Ans	☐ 1. The arc is exposed to the atmosphere during welding ☐ 2. The arc is shielded only by inert gas during welding ☒ 3. The arc is completely covered by a layer of flux ☐ 4. The arc is visible and produces bright light during welding
Q.55	Which of the following is not a type of friction?
Ans	☐ 1. Rolling friction ☐ 2. Static friction ☒ 3. Gravitational friction ☐ 4. Kinetic friction
Q.56	Which of the following best describes the function of a hoist in material handling systems?
Ans	☐ 1. Sorting materials by size during material handling ☐ 2. Moving loads horizontally between different workstations ☐ 3. Rotating loads for alignment during material handling ☒ 4. Lifting and lowering loads vertically with controlled movement
Q.57	What is the main chemical change that occurs on the metal surface during anodizing?
Ans	☐ 1. Removal of the oxide layer ☐ 2. Deposition of metallic ions ☒ 3. Formation of a thick oxide layer ☐ 4. Dissolving the metal away
Q.58	In a two-stroke diesel engine, the exhaust gases are removed through:
Ans	☒ 1. Ports ☐ 2. Spark plug ☐ 3. Carburetor ☐ 4. Valves
Q.59	What is the nature of strain as a physical quantity?
Ans	☐ 1. It has units of length. ☐ 2. It has units of force per area. ☒ 3. It is dimensionless. ☐ 4. It has units of volume.

Q.60	Which of the following best defines the specific weight of a fluid?
Ans	☐ 1. The weight of fluid per unit mass ☐ 2. The weight of fluid per unit pressure ☐ 3. The weight of fluid per unit force ☒ 4. The weight of fluid per unit volume
Q.61	A centrifugal pump is designed to deliver water at a rate of $Q = 0.1 \text{ m}^3/\text{s}$ against a total head of $H = 25 \text{ m}$. If the overall efficiency of the pump is $\eta = 75\%$, what is the approximate power input required to drive the pump? (Assume the density of water is $\rho = 1000 \text{ kg/m}^3$ and the acceleration due to gravity is $g = 9.81 \text{ m/s}^2$).
Ans	☒ 1. 32.7 kW ☐ 2. 43.6 kW ☐ 3. 58.1 kW ☐ 4. 24.5 kW
Q.62	Why is a steady rest sometimes used in cylindrical grinding?
Ans	☐ 1. To cool the workpiece during grinding ☐ 2. To align the grinding wheel to the table ☒ 3. To support long workpieces during rotation ☐ 4. To hold abrasive materials for grinding
Q.63	A center drill is used before drilling because it:
Ans	☐ 1. Increases the temperature at the cutting zone ☒ 2. Provides a pilot hole to guide the main drill ☐ 3. Removes burrs and debris from the drilled hole ☐ 4. Reduces the spindle rotation of the lathe
Q.64	A hollow shaft has an outer diameter twice its inner diameter of a solid shaft, both constructed from the same material, and having identical outer diameters. The ratio of their torsional strength is:
Ans	☐ 1. $\frac{13}{14}$ ☐ 2. $\frac{2}{3}$ ☒ 3. $\frac{15}{16}$ ☐ 4. $\frac{5}{9}$
Q.65	The most effective method for applying cutting fluid during high-speed machining is:
Ans	☐ 1. Atomized spray ☐ 2. Drip system ☐ 3. Hand pouring ☒ 4. Flooding
Q.66	If the electrolyte does not contain metal ions of the plating metal, what is the most likely outcome?
Ans	☐ 1. The anode will become coated with metal ☒ 2. No metal will deposit on the cathode ☐ 3. The process will create a thick oxide layer ☐ 4. The cathode will dissolve in the solution

Q.67	With an increase in angle of the inclined surface, the maximum angle at which a body starts sliding down the plane is called _____.
Ans	✗ 1. Static friction ✗ 2. cone angle ✗ 3. limiting friction ✓ 4. angle of friction
Q.68	For a small spherical droplet of liquid with surface tension σ and diameter d , which of the following correctly expresses the pressure intensity inside the droplet p due to surface tension?
Ans	✗ 1. $p = \frac{2\sigma}{d}$ ✓ 2. $p = \frac{4\sigma}{d}$ ✗ 3. $p = \frac{6\sigma}{d}$ ✗ 4. $p = \frac{\sigma}{d}$
Q.69	After leaving the low-pressure cylinder in a two-stage air compressor, where does the air go next?
Ans	✓ 1. To the intercooler ✗ 2. Back to the atmosphere ✗ 3. To the high pressure cylinder directly ✗ 4. To the air receiver tank
Q.70	Why is direct current (DC) commonly used in MIG (metal inert gas) welding?
Ans	✗ 1. It limits the types of metals that can be welded ✓ 2. It offers a stable arc and consistent metal transfer ✗ 3. It reduces penetration for thick materials ✗ 4. It increases spatter for faster welding
Q.71	Which of the following plots is used for the classification of types of facilities and layouts used for different levels of the production?
Ans	✗ 1. Production mass vs. product variety plot ✗ 2. Production quantity vs. product cost plot ✓ 3. Production quantity vs. product variety plot ✗ 4. Product cost vs. product variety plot
Q.72	The type of surface produced by a taper turning operation performed on a lathe machine is:
Ans	✗ 1. curved one ✗ 2. flat ✓ 3. conical ✗ 4. cylindrical
Q.73	Which property most significantly differentiates mild steel from alloy steel when exposed to high-temperature mechanical stress in industrial applications?
Ans	✗ 1. Mild steel provides improved wear resistance under high temperatures compared to alloy steel ✓ 2. Alloy steel maintains higher mechanical strength at elevated temperatures compared to mild steel ✗ 3. Alloy steel demonstrates greater ductility at elevated temperatures than mild steel ✗ 4. Mild steel has enhanced corrosion resistance at high temperatures compared to alloy steel

Q.74	Given are four concurrent forces: 10 N east, 20 N north, 15 N west, 25 N south. What is the direction of the resultant force?
Ans	☐ 1. North-east ☒ 2. South-west ☐ 3. South-east ☐ 4. North-west
Q.75	_____ is used to measure the pressure difference in a Venturi meter.
Ans	☐ 1. Bourdon gauge ☒ 2. Manometer ☐ 3. Rotameter ☐ 4. Pitot tube
Q.76	A company faces an annual demand of 10,000 units, a fixed ordering cost of ₹200 per order, and a holding cost of ₹4 per unit per year. What is the EOQ for this company?
Ans	☐ 1. The EOQ is 4000 units ☒ 2. The EOQ is 1000 units ☐ 3. The EOQ is 5000 units ☐ 4. The EOQ is 2240 units
Q.77	In malleability, material is subjected to which of the following stresses?
Ans	☐ 1. Fatigue stress ☐ 2. Shear stress ☐ 3. Tensile stress ☒ 4. Compressive stress
Q.78	Which of the following is NOT a type of water-based cutting fluid?
Ans	☐ 1. Dispersion ☒ 2. Grease ☐ 3. Emulsion ☐ 4. Solution
Q.79	Which component in a cylindrical grinding machine provides longitudinal movement to the workpiece?
Ans	☐ 1. Wheel guard for safety ☐ 2. Coolant system with pump ☒ 3. Table with sliding mechanism ☐ 4. Spindle for work rotation
Q.80	Under which scenario is a body on an inclined plane most likely to slip when subjected to a parallel force?
Ans	☐ 1. Frictional force equals weight of the body ☒ 2. Coefficient of friction is less than tangent of inclination ☐ 3. Normal reaction is greater than weight ☐ 4. Parallel force is opposite to frictional force
Q.81	Which of the following can be measured using interferometry?
Ans	☐ 1. Frequency of vibration ☐ 2. Linear displacement ☒ 3. Surface roughness ☐ 4. Depth of micro-grooves

Q.82	The saddle of a lathe carriage:
Ans	☐ 1. Moves the lead screw mechanism ☒ 2. Supports the cross-slide and tool post ☐ 3. Controls spindle speed automatically ☐ 4. Rotates the workpiece against tool
Q.83	Why is facing operation critical for assembly parts?
Ans	☐ 1. It improves the cutting tool life during machining operation. ☐ 2. It reduces the hardness of the material at the surface region. ☒ 3. It ensures the end surface is flat and perpendicular to the axis. ☐ 4. It increases the overall strength of the workpiece material.
Q.84	Which characteristic is assessed in the bend test for welded joints?
Ans	☒ 1. Ductility of the weld metal ☐ 2. Magnetic properties check ☐ 3. Surface finish of the weld ☐ 4. Chemical composition check
Q.85	Mild steel shows poor corrosion resistance mainly because it:
Ans	☒ 1. Does not contain protective elements like chromium or nickel ☐ 2. Forms a dense but non-protective oxide layer on the surface ☐ 3. Contains a relatively high amount of carbon ☐ 4. Possesses a non-uniform and less stable microstructure
Q.86	For drilling a hole on a lathe, the drilling tool is placed in the _____.
Ans	☐ 1. tool post ☒ 2. tailstock ☐ 3. chuck ☐ 4. carriage
Q.87	What is the role of the acute angle attachment in a Bevel Protractor?
Ans	☐ 1. To adjust the stock ☐ 2. To measure linear distances ☒ 3. To measure acute angles less than 90° ☐ 4. To lock the vernier scale
Q.88	Which of the following pair of processes in the Otto cycle are both isentropic?
Ans	☐ 1. Compression and heat rejection processes ☐ 2. Heat addition and heat rejection processes ☐ 3. Expansion and heat addition processes ☒ 4. Compression and expansion processes

Q.89	The maximum bending moment for a simply supported beam of span L with uniformly distributed load (UDL) w per unit length is ____.
Ans	✗ 1. $\frac{WL^2}{16}$ ✗ 2. $\frac{WL^2}{2}$ ✗ 3. $\frac{WL^2}{12}$ ✓ 4. $\frac{WL^2}{8}$
Q.90	You must inspect a welded aluminum structure for both surface and internal defects with minimal health risk to operators. Which combination of tests is most appropriate?
Ans	✗ 1. Radiographic and magnetic particle testing ✓ 2. Dye penetrant and ultrasonic testing ✗ 3. Radiographic and ultrasonic testing ✗ 4. Visual and magnetic particle testing
Q.91	The center of pressure for a submerged horizontal plane surface is:
Ans	✗ 1. The point of total hydrostatic force, located below the centroid when the surface is inclined ✓ 2. The centroid of the plane surface, representing the geometric center of the submerged area ✗ 3. The top edge of the submerged surface, taken as the uppermost boundary of fluid contact ✗ 4. A position independent of the depth of immersion, unaffected by how far the surface is submerged
Q.92	In _____ process, heat is added during Otto cycle.
Ans	✗ 1. Isentropic compression ✗ 2. Constant pressure ✗ 3. Isothermal expansion ✓ 4. Constant volume
Q.93	Which defect is most likely to result from excessive carburizing time in steel heat treatment?
Ans	✗ 1. Increase in porosity throughout the component ✗ 2. Development of coarse pearlite across the section ✗ 3. Initiation of intergranular corrosion in the core ✓ 4. Formation of excessive retained austenite at the surface
Q.94	Corrosion resistance of alloy steels can be increased further by:
Ans	✗ 1. Improving surface finish through mechanical polishing ✗ 2. Adding a small percentage of copper to the composition ✓ 3. Using protective coatings or chemical passivation treatment ✗ 4. Increasing the overall carbon content in the alloy
Q.95	A company manufactures a component at a variable cost of ₹40 per unit and incurs a fixed cost of ₹2,00,000 per year. An outside supplier offers the same component at ₹60 per unit. What should the company do if the annual demand is 12,000 units?
Ans	✗ 1. Outsource production to the supplier as it saves more money ✗ 2. Split production equally between manufacturing and outsourcing ✓ 3. Continue manufacturing the component in-house as it is more cost-effective ✗ 4. Reduce production and buy the remaining units from the supplier

Q.96	In a workshop, why might a lever-operated hoist be preferred over an electric hoist for certain applications?
Ans	☐ 1. Lower initial cost and larger load lifting capacity ☐ 2. High lifting speed and remote control capabilities ☐ 3. Continuous operation and automatic overload protection ☒ 4. Portability and suitability for short, manual lifting operations
Q.97	Which of the following is a limitation of mechanical comparators?
Ans	☐ 1. They cannot measure linear dimensions ☒ 2. Mechanical wear can reduce accuracy over time ☐ 3. They cannot measure small deviations ☐ 4. They require electricity
Q.98	The point of contraflexure occurs where _____.
Ans	☐ 1. Shear force is zero ☒ 2. Bending moment changes sign ☐ 3. Load intensity is zero ☐ 4. Bending moment is maximum
Q.99	How do the gear mechanism and braking system in a hoist contribute to safe lifting operations?
Ans	☐ 1. The gear mechanism increases speed and the brake system adds force to lifting ☐ 2. The brake system increases speed and the gear mechanism holds the load steady ☐ 3. Both gear mechanism and brake system work only during lowering of load ☒ 4. The gear mechanism reduces speed while the brake system holds the load steady
Q.100	When selecting an organic coating for a steel structure exposed to outdoor conditions, which combination of properties should be prioritized for effective long-term performance?
Ans	☒ 1. Strong adhesion to substrate and high resistance to ultraviolet radiation. ☐ 2. Ability to dissolve in water and rapid drying at room temperature. ☐ 3. High chemical reactivity and low cohesion with steel to form a sacrificial layer. ☐ 4. Low viscosity and low electrical insulation properties in the formulation.