

B.Sc. Degree in Mechanical Engineering

Model Exit Exam Questions

1. A material is said to be allotropic, if it has
 - a) Fixed structure at all temperatures
 - b) Atoms distributed in random pattern
 - c) Different crystal structures at different temperatures
 - d) Any one of the above
2. The following types of materials are usually the most ductile
 - a) Face centered cubic lattice
 - b) Body centered cubic lattice
 - c) Hexagonal close packed lattice
 - d) All of the above
3. It's a One-dimensional defect around which some of the atoms are misaligned.
 - a) Screw dislocation
 - b) Point defect
 - c) Dislocation
 - d) Vacancy
4. Fick's law is given by the formula
 - a) $N_b = - D_{bc} d C_b / d x$
 - b) $N_b = - 2 D_{bc} d C_b / d x$
 - c) $N_b = - 3 D_{bc} d C_b / d x$
 - d) $N_b = - 4 D_{bc} d C_b / d x$
5. The purpose of heat treatment is to
 - a) Relieve the stresses set up in the material after hot or cold working
 - b) Modify the structure of the material
 - c) Change grain size
 - d) Any one of these
6. It's a graphical representation of all the equilibrium phases as a function of temperature, pressure, and composition.
 - a) Phase
 - b) Phase diagram
 - c) equilibrium
 - d) All
7. Which of the following part of mechanics deals with study of crack propagation?
 - a) Solid mechanics
 - b) Fluid mechanics
 - c) Applied mechanics
 - d) Fracture mechanics
8. Corrosion resistance of steel is increased by addition of

- a) Chromium and nickel
 - b) Sulphur, phosphorus, lead
 - c) Vanadium, aluminium
 - d) Tungsten, molybdenum, vanadium, chromium
9. A eutectoid reaction involves which of the following phases?
- a) One liquid and one solid
 - b) One liquid and two solid
 - c) Three solid
 - d) Two liquid and one solid
10. Titanium is added to molten aluminium alloys before casting for the purpose of
- a) grain refinement
 - b) increasing corrosion resistance
 - c) reducing porosity
 - d) improving fluidity
11. The extend of deformation due to mechanical twinning is ____ than slip deformation.
- a) smaller
 - b) larger
 - c) equal
 - d) average
12. The continuous phase of a composite material is known as its _____.
- a) fiber phase
 - b) matrix phase
 - c) dispersed phase
 - d) surrounding phase
13. In permanent mold casting method
- a) molten metal is poured in a metallic mold, retained in the mold long enough for the outer skin to solidify and finally mold is turned over to remove molten metal still in molten condition
 - b) molten metal is poured and allowed to solidify while the mold is revolving
 - c) molten metal is forced into mold under high pressure
 - d) none of the above
14. Two streams of liquid metal which are not hot enough to fuse properly result into a casting defect known as
- a) Cold shut
 - b) Swell
 - c) Sand wash
 - d) Scab
15. Match the following metal forming processes with their associated stresses in the work piece.

Metal forming process

- 1. Coining
- 2. Wire Drawing
- 3. Blanking

Types of stress

- A. Tensile
- B. Shear
- C. Tensile and compressive

4. Bending

(A) 1-A, 2-B, 3-D, 4-C

(C) 1-D, 2-A, 3-B, 4-C

D. Compressive

(B) 1-D, 2-A, 3-C, 4-B

(D) 1-A, 2-C, 3-B, 4-D

16. Which one is true about Extrusion?

a) is extensively used for making bolts and nuts

b) is used for reducing the diameter of round bars and tubes by rotating dies which open and close rapidly on the work

c) is used to improve fatigue resistance of the metal by setting up compressive stresses in its surface

d) consists of pressing the metal inside a chamber to force it out by high pressure through an orifice which is shaped to provide the desired form of the finished part

17. Process of forming metal powder by directing molten metal through an orifice after which it is break into small particle using high pressure fluid is known as?

a) Atomization

b) Reduction

c) Crushing

d) Electrolysis

18. Which of these statements is correct about machining?

a) The cutting pressure drops as cutting velocity increases.

b) Power required drops as metal temperature and cutting velocity increase.

c) We can use the quantity of metal removed by it to estimate the required horsepower of a machine tool.

d) All of the above.

19. In a single point tool, the angle between the surface of the flank immediately below the point and a line drawn from the point perpendicular to the base, is known as

a) Side relief angle

b) End relief angle

c) Back rake angle

d) Side rake angle

20. Knowledge of the cutting forces and power involved in machining operations is important for the following reasons EXCEPT

a) Machine tools can be properly designed to minimize distortion of the machine components

b) Power requirements must be known in order to enable the selection of a machine tool with adequate electric power.

c) The work-piece is capable of withstanding these forces without excessive distortion

d) none the above

21. What is the type of joining process called, where the parts to be welded are kept in contact and rotated relative to each other and axial pressure is applied when the desired temperature is obtained?

a) Ultrasonic welding

b) Forge welding

- c) Electron beam welding
 - d) Friction welding
22. What is the type of welding defect caused due to poor deposition of weld rod is called?
- a) Porosity
 - b) Undercut
 - c) Under fill
 - d) Crack
23. Thermoplastics are examples of
- a) Carbon and graphite matrix composites
 - b) Metal matrix composites
 - c) Ceramic matrix composites
 - d) Polymer matrix composites
24. When the reference junction is the same temperature as the measurement junction in a thermocouple circuit, the output voltage (measured by the sensing instrument) is:
- a) Zero
 - b) Reverse polarity
 - c) Noisy
 - d) AC instead of DC
25. A type J thermocouple is made of the following metals:
- a) Aluminum and Tungsten
 - b) Iron and Constantan
 - c) Platinum and Platinum/Rhodium alloy
 - d) Copper and Constantan
26. Strain gauges are resistance devices in a Wheat stone bridge configuration _____
- a) which does not require bridge completion circuitry and an excitation source
 - b) which requires bridge completion circuitry and an excitation source
 - c) which neither requires bridge completion circuitry nor an excitation source
 - d) which requires bridge completion circuitry but does not an excitation source
27. potentiometer may be used for
- a) measurement of resistance
 - b) calibration of ammeter
 - c) calibration of voltmeter
 - d) all of the above
28. The function of shunt in an ammeter is to

- a) by pass the current
- b) increase the sensitivity of the ammeter
- c) increase the resistance of ammeter
- d) none of the above

29. Potentiometer as a displacement sensor works on the principle of _____

- a) Mutual Inductance
- b) Self Inductance
- c) Variable Resistance Transduction
- d) Hall Effect

30. The chemical sensor in the washing machine is used _____

- a) To count the quantity of detergent
- b) To measure the amount of water
- c) To measure the pH value of water
- d) For drying operations

31. Why Wheatstone bridge is generally used in DC circuit?

- a) To determine resistance
- b) To determine capacitance
- c) To determine inductance
- d) To determine flux.

32. What are transducers?

- a) They convert power from one form to another
- b) They convert work from one form to another
- c) They convert work to power
- d) They convert energy from one form to another

33. Which among the following is a correct statement regarding “Mechatronic system”?

- a) Its initial cost of setup is low
- b) Cheaper maintenance
- c) More output in less time
- d) Any individual can operate these system

34. The main function of Actuator is _____.

- a) To produce motion
- b) Detect input
- c) Detect output
- d) Detect the state of the system

35. What is fluid mechanics used for?

- a) To comprehend the behaviour of solid fluids under pressure
- b) To comprehend the behaviour of fluids under a variety of forces & atmospheric conditions
- c) To comprehend the behaviour of fluids under various temperatures only

d) None of the mentioned

36. Which of the following method is most commonly used in fluid mechanics for analysis?

- a) Eulerian Method
- b) Control volume analysis
- c) Lagrangian method
- d) None of the mentioned

37. When a fluid is subjected to resistance, it undergoes a volumetric change due to _____?

- a) Cohesion
- b) Strain
- c) Compressibility
- d) Adhesion

38. Loss of head due to friction is

- a) Directly proportional to hydraulic radius
- b) Inversely proportional to velocity
- c) Inversely proportional to hydraulic radius
- d) Directly proportional to gravitational constant

39. Which one of the following is the dimension of specific volume of a liquid?

- a) $[M^1 L^{-3} T^0]$.
- b) $[M^{-1} L^3 T^0]$.
- c) $[M^{-1} L^{-3} T^0]$.
- d) $[M^0 L^3 T^0]$.

40. What is the principal cause of action of buoyant force on a body submerged partially or fully in fluid?

- a) Displacement of fluid due to submerged body
- b) Development of force due to dynamic action
- c) Internal shear forces mitigating external forces
- d) None of the mentioned

41. A silver cube, with 5cm side length is placed in a gas stream that is at 33°C and how long will it take for the cube temperature to reach 25°C from 0°C ?

Assumptions: 1. The thermal property of the cube is constant. 2 The heat transfer coefficient is constant and uniform over the entire surface. The properties of silver are given to be $k = 429 \text{ W/m} \cdot ^\circ\text{C}$, $\rho = 10,500 \text{ kg/m}^3$, and $c_p = 0.235 \text{ kJ/kg} \cdot ^\circ\text{C}$.

- a) 2 min
- b) 38.4 min
- c) 40.5 min
- d) 15 min

42. Using the energy balance method, derive the finite difference equation for the m, n nodal point located on a plane, insulated surface of a medium with uniform heat generation.

- a) $T_{m,n-1} + T_{m-1,n} - 2T_{m,n} = 0$
- b) $T_{m,n-1} + 2T_{m-1,n} + T_{m,n+1} - 4T_{m,n} + q''(dx \cdot dy)/k = 0$
- c) $T_{m,n-1} + T_{m-1,n} + T_{m,n+1} - 4T_{m,n} + q''(dx \cdot dy)/k = 0$
- d) $T_{m,n-1} + T_{m-1,n} - 4T_{m,n} = 0$

43. A long, circular aluminium rod attached at one end to the heated wall and transfers heat through convection to a cold fluid. (a) If the diameter of the rod is tripled, by how much would the rate of heat removal change?

- a) 520 %
- b) 100%
- c) 25%
- d) 200%

44. When the fluid flows over solid surface and the boundary condition is given as a No-slip condition, what is the relative velocity of the fluid /solid interface?

- a) Free stream velocity
- b) 5
- c) 0
- d) None

45. At the solid-fluid convective interface, the thermal conductivity of the solid and fluid are given as $K_s = 2 K_f$ and the Biot number is 0.07. What is the value of the Nu.

- a) 0.28
- b) 2
- c) 0.7
- d) 0.14

46. From heat transfer rate concept related to a heat exchanger, if your design resulted a small value of ΔT that leads to higher cost of the exchanger, what will be your other options that can be implement and reduce the cost of the construction of the heat exchanger .

- a) Increasing the area of the heat exchanger

- b) Minimizing the heat transfer area by using fin
 - c) Selecting from a variety of exchanger designs that can minimize the product of overall heat transfer coefficient and area
 - d) Selecting higher flow rate on the heat transfer fluid side
47. In aircraft, the air refrigeration cycle is used because of
- a) High heat transfer rate
 - b) Low weight per ton of refrigeration
 - c) Higher coefficient of performance
 - d) Low temperature at high altitudes
48. A reversible engine has ideal thermal efficiency of 30%. When it is used as a refrigerating machine with all other conditions unchanged, the coefficient of performance will be
- a) 1.23
 - b) 2.33
 - c) 3.33
 - d) 4.23
49. In a lithium bromide absorption refrigeration system
- a) Ammonia is used as a refrigerant and lithium bromide as an absorbent
 - b) Water is used as a refrigerant and lithium bromide as an absorbent
 - c) Lithium bromide is used as a refrigerant and water as an absorbent
 - d) All
50. The condition of refrigerant after passing through the condenser in a vapour compression system is
- a) Saturated liquid
 - b) Dry saturated vapour
 - c) Wet vapour
 - d) Superheated vapour
51. When the lower temperature of a refrigerating machine is fixed, then the coefficient of performance can be improved by
- a) Operating the machine at higher speeds
 - b) Operating the machine at lower speeds
 - c) Raising the higher temperature
 - d) Lowering the higher temperature

52. Which of the following process is used in winter air conditioning?
- a) Cooling and Dehumidification
 - b) Heating and Humidification
 - c) Dehumidification
 - d) Humidification
53. In closed moving boundary system, a positive change in internal energy occur when,
- a) Heat is added and work is done by the system
 - b) Heat is removed and work is done by the system
 - c) Heat is added and work done is zero
 - d) Heat is added and work is done on the system
54. Heat transfer and work transfer are
- a) boundary phenomena
 - b) energy interactions
 - c) energy in the transit
 - d) all of the mentioned
55. Which one of the following is a formula for a closed system adiabatic process
- a) $Q - W = \Delta U$
 - b) $-W = \Delta U$
 - c) $Q = \Delta U$
 - d) $Q - W = 0$
56. Which of the following is true according to Clausius's statement?
- a) it is possible to construct a device that can transfer heat from a cooler body to a hotter body without any effect
 - b) it is impossible to construct a device that can transfer heat from a cooler body to a hotter body without any effect
 - c) it is impossible to construct a device that can transfer heat from a hotter body to a cooler body without any effect
 - d) none of the mentioned
57. What is the relationship between Kelvin-Planck's and Clausius' statements?
- a) violation of one doesn't violate the other
 - b) not connected to each other
 - c) virtually two parallel statements of the second law
 - d) none of the mentioned

58. Which one is true for thermal efficiency of actual and reversible heat engine operating between the same temperature limit

- a) The heat engine is irreversible if $\eta_{th} < \eta_{th,rev}$
- b) The heat engine is reversible if $\eta_{th} = \eta_{th,rev}$
- c) The heat engine is impossible if $\eta_{th} > \eta_{th,rev}$
- d) All of the above

59. The entropy of any closed system can increase in which of the following way?

- a) dissipative effects or internal irreversibilities
- b) by heat interaction in which there is entropy transfer
- c) both of the mentioned
- d) none of the mentioned

60. Considering the thermodynamic properties, which one of the following could be a formula to find the work done by a turbine?

- a) $\dot{W}_{e,in} + \dot{m}h_1 = \dot{Q}_{out} + \dot{m}h_2$
- b) $\dot{W}_{in} = \dot{m}\dot{Q}_{out} + \dot{m}(h_2 - h_1)$
- c) $\dot{Q}_{in} + \dot{m}_w h_1 = \dot{m}_w h_2$
- d) $\dot{m} \left(h_1 + \frac{v_1^2}{2} + gz_1 \right) = \dot{W}_{out} + \dot{m} \left(h_2 + \frac{v_2^2}{2} + gz_2 \right)$

61. A 500 kg iron block is initially at 200°C and is allowed to cool to 27°C by transferring heat to the surrounding air at 27°C. Determine the reversible work. $C = 0.45$ kJ/kg K for iron.

- a) 8191 kJ
- b) 38,925 kJ
- c) 712 kJ
- d) None

62. Dalton's law for ideal-gas mixtures states that the pressure of a gas mixture is equal to the sum of the pressures each gas would exert if.

- a) It existed alone at the mixture temperature and pressures
- b) It existed alone at the mixture pressures and volume
- c) It existed alone at the mixture temperature and volume
- d) It existed alone at the mixture temperature only

63. The amount of heat released when a fuel is burned completely in a steady-flow process and the products are returned to the state of the reactants equals to.

- a) The enthalpy of combustion of the fuel

- b) Absolute value of the enthalpy of combustion of the fuel
- c) The enthalpy of formation
- d) None

64. What is the benefit of having multiple cylinders in a reciprocating engine?

- a) Increased fuel efficiency
- b) More power output
- c) Quieter engine operation
- d) Lower overall cost and complexity

65. The major loss in a S.I. engine is due to _____

- a) variation in specific heat and chemical equilibrium
- b) Pumping
- c) exhaust blow down
- d) incomplete combustion

66. What is the firing order of a six cylinder I.C. engine?

- a. 1-5-3-4-2-6
- b. 1-3-6-5-2-4
- c. 1-4-2-5-6-3
- d. 1-6-2-5-4-3

67. Which of the following is the correct sequence of the decreasing order of brake thermal efficiency of the three given basic types of engines?

- a) 4-stroke S.I. engine, 4-stroke C.I. engine, 2-stroke S.I. engine
- b) 4-stroke C.I. engine, 4-stroke S.I. engine, 2-stroke S.I. engine
- c) 4-stroke S.I. engine, 2-stroke S.I. engine, 4-stroke C.I. engine
- d) 2-stroke C.I. engine, 4-stroke C.I. engine, 4-stroke S.I. engine

68. Indicated power of a 4-stroke engine is equal to _____

- a. $4p_{LAN}$
- b. $\frac{p_{LAN}}{2}$
- c. p_{LAN}
- d. $2p_{LAN}$

69. Which of the following is the main aim of an engine management system to achieve?

- a) low levels of gaseous and particulate emissions
- b) high reliability and durability with lowest possible initial cost
- c) high power output and torque
- d) all of the mentioned

70. Turbomachines can be classified: _____

- a) Based on power transfer
- b) Based on the flow path
- c) Based on the manner in which the fluid moves through and around a machine
- d) All of the above

71. The principal operation of turbomachines are:_____.

- a) Extracting energy from a fluid by the dynamic action of a rotating part.
- b) Imparting energy to a fluid by the dynamic action of a rotating part.
- c) Extract energy from a fluid or imparts energy to a fluid by the dynamic action of a rotating part.
- d) None of the above.

72. Which energy losses of turbomachines are related to efficiencies?

- a) Disc or hydraulic friction energy loss.
- b) Mechanical friction energy loss.
- c) Volumetric or leakage energy loss.
- d) All of the above

73. Euler's equation is applicable for

- a) Centrifugal compressor
- b) Axial compressor
- c) Pumps
- d) all of the above

74. Since it can be used to identify the type of machine (axial, mixed, radial, etc.), _____ has particular significance in turbomachinery among the following dimensionless parameters.

- a) Specific speed
- b) Head coefficient
- c) Speed ratio
- d) Specific Power

75. Which of the following statements about turbomachines and positive-displacement machine is true?

- a) Turbomachines operate at high rotational speed than positive-displacement Machines
- b) Compared to turbomachines, positive displacement machines are less efficient.
- c) Turbomachines involve an unsteady flow of fluid & reciprocating motion.
- d) All of the above

76. Cranes are used for

- a) lifting and lowering
- b) vertical transportation
- c) both 'a' and 'b'
- d) none of the above

77. The following is used to transport materials having flat bottoms

- a) Belt conveyor
- b) Roller conveyor
- c) Chain conveyor
- d) None of the above

78. Ecology Principle in material handling selection procedure is

- a) Minimize adverse effects on the environment
- b) Considering ergonomic
- c) Minimizing cost
- d) Minimizing energy

79. What is the correct order for steps in material handling equipment selection

1. Analyze the data.
2. Evaluate alternative
3. Identify and define the problem.
4. Collect relevant data.
5. Choose the preferred solution.
6. Apply the solution

- a) 3-2-1-6-5-4 b) 5-2-1-4-5-6 c) 3-4-1-2-5-6 d) 2-3-1-4-6-5

80. Which of the following is the first step in designing a hoisting equipment?

- a) Selecting the type of hoisting equipment
- b) Calculating the load capacity
- c) Determining the lifting height
- d) Designing the hoisting mechanism

81. Which of the following is the most important factor to consider when designing a conveying equipment?

- a) The distance the material needs to be conveyed
- b) The type of material to be conveyed
- c) The desired capacity of the conveying system
- d) The cost of the conveying equipment

82. Which type of linkage mechanism gives you the ability to move the direction through a 90 degrees angle

- a) A reverse motion linkage

- b) Parallel Motion (Push/Pull) Linkage
- c) **Bell Crank Linkage**
- d) Crank and Slider Linkage

83. What are the purpose of computer aided design in mechanism of machinery especially in kinematics and kinetics analysis?

- a) Because both graphical and analytical, can be very complex and time consuming for all.
- b) Computer software packages facilitate the automation of the trial-and-error process inherent in the design of mechanisms.
- c) Instead of cranking through equations by hand, the mechanism designer or analyst can specify characteristics of the mechanism and use the computer to calculate the kinematic and/or dynamic quantities of interest.

d) **All**

84. Which of the following is correct about kinematic analysis of mechanism

- a) The analysis of the mechanism is done by calculating the position, velocity and acceleration at various points on the mechanisms.
- b) In analysis of motion of a particular mechanism, it isn't need to calculate forces & stresses acting in the parts of the mechanism.
- c) In analysis of motion of a particular mechanism, it isn't need to consider the cross-section area or strength of the parts in that mechanism.

d) **All**

85. In a clock mechanism, the gear train used to connect minute hand to hour hand, is

- a) Epicyclic gear train
- b) **Reverted gear train**
- c) Compound gear train
- d) Simple gear train

86. In turning moment diagram, the variation of energy above and below the mean resisting torque line is called

- a) **Fluctuation of energy**
- b) Maximum fluctuation of energy
- c) Coefficient fluctuation of energy

- d) None of the mentioned
87. Hooke's law holds good up to
- a) yield point
 - b) elastic limit
 - c) plastic limit
 - d) breaking point
88. When the material is loaded within elastic limit, then the stress is to strain.
- a) equal
 - b) directly proportional
 - c) inversely proportional
 - d) not related
89. In which of the following case stress concentration factor is ignored?
- a) Ductile material under static load
 - b) Ductile material under fluctuating load
 - c) Brittle material under static load
 - d) Brittle material under fluctuating load
90. A bolt of $M\ 24 \times 2$ means that
- a) the pitch of the thread is 24 mm and depth is 2 mm
 - b) the cross-sectional area of the threads is 24 mm²
 - c) the nominal diameter of bolt is 24 mm and the pitch is 2 mm
 - d) the effective diameter of the bolt is 24 mm and there are two threads per cm
91. When a helical compression spring is subjected to an axial compressive load, the stress induced in the wire is
- (a) tensile stress
 - (b) compressive stress
 - (c) shear stress
 - (d) bending stress
92. A thin spherical shell of internal diameter d is subjected to an internal pressure p . If σ_t is the tensile stress for the shell material, then thickness of the shell (t) is equal to

(a) $\frac{P.d}{\sigma_t}$

(c) $\frac{P.d}{3 \sigma_t}$

(b) $\frac{P.d}{2 \sigma_t}$

(d) $\frac{P.d}{4 \sigma_t}$

Answer (b)

93. Two shafts will have equal strength, if

- (a) Diameter of both the shafts is same
- (b) Angle of twist of both the shafts is same
- (c) Material of both the shafts is same
- (d) **Twisting moment of both the shafts is same**

94. The generally acceptable failure theory for brittle materials

- a) Maximum shear stress
- b) Distortion energy
- c) Ductile coulomb-Mohr
- d) **None**

95. Which one of the following is true about machine design

- a) The process of designing effective parts or components for machinery
- b) The design of components and systems of a mechanical nature—machines, products, structures, devices and instruments.
- c) The creation of machinery that works safely, reliably, and well.
- d) **All**

96. Design that allows modifications to the trial and/or statistical procedures of the trial after its initiation without undermining its validity and integrity.

- a) Developmental Design
- b) **New Design**
- c) Adaptive Design
- d) Prototype

97. For components made of ductile materials like steel, subjected to static loading which of the following strength is used as a failure of criterion?

- a) **Yield strength**
- b) Ultimate strength

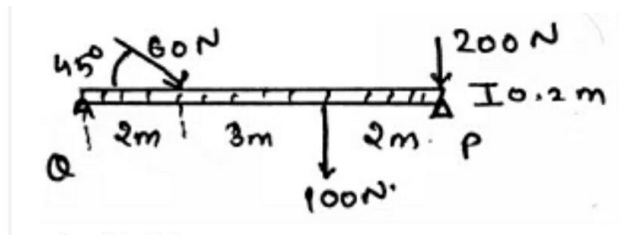
- c) Endurance limit
- d) None of the mentioned

98. What is the minimum diameter of a solid steel shaft that will not twist through more than 3° in a 6-m length when subjected to a torque of $12 \text{ kN}\cdot\text{m}$? What maximum shearing stress is developed? Use $G = 83 \text{ GPa}$.

- a) 41.27 MPa
- b) 50 MPa
- c) 36.45 MPa
- d) 27 MPa

99. Determine the horizontal components of the reaction on the beam caused by the pin at P.

The force 60N is multiplied by 10 and then is applied.



- a) 424N
- b) 24N
- c) 44N
- d) 441N

100. At a point in a piece of elastic material direct stresses of 90 MN/m^2 tensile and 50 MN/m^2 compressive are applied on mutually perpendicular planes. The planes are also subjected to a shear stress. If the greater principal stress is limited to 100 MN/m^2 tensile, determine the value of the shear stress?

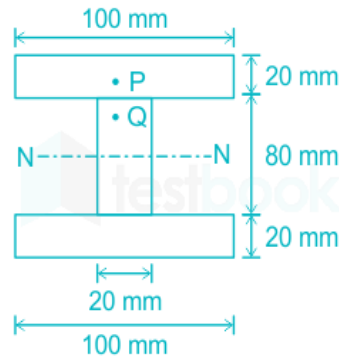
- a) 30 MN/m^2
- b) 38.8 MN/m^2
- c) 45 MN/m^2
- d) 28 MN/m^2

101. A material is subjected to two mutually perpendicular strains, $E_x = 350 \times 10^{-6}$ and $E_y = 50 \times 10^{-6}$ together with an unknown shear strain γ_{xy} . If the principal strain in the material is 420×10^{-6} determine the magnitude of the shear strain;

- a) $324 \times 10^{-6} \text{ radian}$

- b) 783×10^{-6} radian
 - c) 300×10^{-6} radian
 - d) 410×10^{-6} radian
102. Resilience can also be termed as _____
- a) Stress energy
 - b) **Strain energy**
 - c) Modulus
 - d) Tenacity
103. The strain energy in a member is proportional to _____
- a) Product of stress and the strain
 - b) Total strain multiplied by the volume of the member
 - c) The maximum strain multiplied by the length of the member
 - d) **Product of strain and Young's modulus of the material**
104. Which one of the following are the important methods which are used for finding out the slope and deflection at a section in a loaded beam:
- a) Double integration method
 - b) **Moment–area method**
 - c) Macaulay's method
 - d) Conjugate beam method
 - e) All
105. Which one is true about moment of inertia?
- a) The moment of inertia of a rotating flywheel is used in a machine to resist variations in applied torque to smooth its rotational output
 - b) The moment of inertia of an area with respect to any given axis is equal to the moment of inertia with respect to the centroidal axis plus the product of the area and the square of the distance between the two axes.
 - c) used to predict the resistance of beams to bending and deflection.
 - d) **All**

106. An I-section of a beam is shown in the figure below. If the shear stress at point P which is very close to the bottom of the flange is 12 MPa, the shear stress at the point Q close to the flange is:

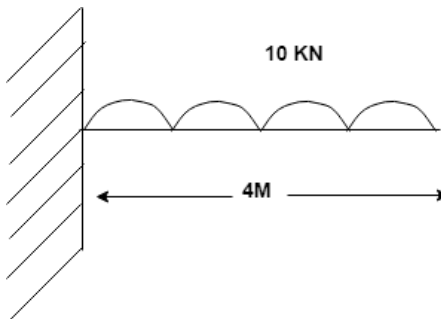


- a. 40 MPa
 - b. 12 MPa
 - c. Indeterminate
 - d. 60 MPa
107. Generalized beam theory is a beam theory especially formulated for thin-walled sections with the capacity of determining the cross-sectional deformation through the combination of a set of predetermined cross-sectional deformation modes.

A. True

B. False

108. Determine the moment at fixed end.



- a) 40 kNm
 - b) 50 kNm
 - c) 60 kNm
 - d) 80 kNm
109. According to exponential law of reliability, the relationship between reliability and system failure due to consistency in occurrence of failure rate, can be generally expressed as
- a) $R = \lambda t$
 - b) $R = -\lambda t$

- c) $R = e^{\lambda t}$
 d) $R = e^{-\lambda t}$
110. What involves measuring the different parameters of machines and equipment such as temperature, vibration, oil pressure and debris, and running performance?
- a) Condition monitoring
 b) Machine monitoring
 c) Fuel monitoring
 d) Oil monitoring
111. What is the purpose of using lubricant?
- a) Increase wear
 b) Increase adhesion
 c) Reduce friction
 d) Increase corrosion rate
112. A systematic approach for maintenance is
- a) Problem – Cause – Diagnosis – Rectification
 b) Problem– Diagnosis – Cause – Rectification
 c) Problem – Measure – Diagnosis – Rectification
 d) Problem– Diagnosis – Measure – Rectification
113. What must be done before removing the guard for maintenance work?
- a) Use barricading tape
 b) Use lockout and tag out to ensure isolation of energy
 c) Display caution board
 d) Inform peoples about the work
114. What is the full form of TPM?
- a) Total Productive Management
 b) Total Process Planning Management
 c) Total Productive Maintenance
 d) Total Planned Maintenance