

PGCET-2018

Seat No. _____

SUB: MECHANICAL ENGINEERING (ME)

Time: 1 Hour 30 minutes

Instructions:

1. Ensure that all pages are printed.
2. Use Black ball pen only
3. Change in option is not allowed
4. There is no negative marking
5. Use of non-programmable scientific calculator is allowed

1. In order to determine the effects of a force, acting on a body, we must know
A Magnitude of the force B Line of action of the force
C Nature of the force D All of the above
2. Concurrent forces are those forces whose lines of action
A Lie on the same line B Meet at one point
C Meet on the same plane D None of these
3. The unit of moment of inertia of an area is
A kg-m^2 B kg-m-s^2
C kg/m^2 D m^4
4. Moment of inertia of a circular section about its diameter(d) is
A $d^3/16$ B $d^3/32$
C $d^4/32$ D $d^4/64$
5. The ratio of static friction to dynamic friction is always
A equal to one B less than one
C greater than one D none of these
6. The bodies which rebound after impact are called
A inelastic bodies B elastic bodies
C neither elastic nor inelastic bodies D none of these
7. The ratio of linear stress to linear strain is called
A modulus of rigidity B modulus of elasticity
C bulk modulus D poisson's ratio
8. A bolt is made to pass through a tube and both of them are tightly fitted with help of washers and nuts. If the nut is tightened, then
A bolt and tube are under tension B bolt and tube are under compression
C bolt is under compression and tube is under tension D bolt is under tension and tube is under compression
9. When a body is subjected to three mutually perpendicular stresses, of equal intensity, the ratio of direct stress to the corresponding volumetric strain is known as
A Young's modulus B modulus of rigidity
C bulk modulus D Poisson's ratio
10. The extremities of any diameter on Mohr's circle represent
A principal stresses B normal stresses on plane at 45°
C shear stresses on plane at 45° D normal and shear stresses on a plane
11. The capacity of a strained body for doing work on removal of the straining force, is called
A strain energy B resilience
C proof resilience D impact energy

12. when there is a sudden increase or decrease in shear force diagram between any two points, it indicates that there is a
- A Point load at the two points B no loading between the two points
 C uniformly distributed load between the two points D uniformly varying load between the two points
13. A spring is used to absorb shocks and vibrations is
- A conical spring B torsion spring
 C leaf spring D disc spring
14. The object of caulking in a riveted joint is to make the joint
- A free from corrosion B stronger in tension
 C free from stresses D leak-proof
15. The buckling load for a given column depends upon
- A area of cross-section of the column B length and least radius of gyration of the column
 C modulus of elasticity for the material of the column D all of the above
16. The columns whose slenderness ratio is less than 80, are known as
- A short columns B long columns
 C weak columns D medium columns
17. The property of liquid which offers resistance to the movement of one layer of liquid over another adjacent layer of liquid, is called
- A surface tension B compressibility
 C capillarity D viscosity
18. The pressure measured with the help of the pressure gauge is called
- A atmospheric pressure B gauge pressure
 C absolute pressure D mean pressure
19. The centre of gravity of the volume of the liquid displaced is called
- A centre of pressure B centre of buoyancy
 C metacentre D none of these
20. A flow in which each liquid particle has a definite path, and the paths of individual particles do not cross each other, is called
- A steady flow B uniform flow
 C streamline flow D turbulent flow
21. For a perfect incompressible liquid, flowing in a continuous stream, the total energy of a particle remains the same, while the particle moves from one point to another. This statement is called
- A continuity equation B Bernoulli's equation
 C Pascal's law D Archimede's principle
22. A pitot tube is used to measure the
- A velocity of the flow at the required point in pipe B pressure difference between two points in a pipe
 C total pressure of liquid flowing in a pipe D discharge through a pipe
23. A pipe of length more than double the diameter of orifice fitted externally or internally to the orifice is called a
- A notch B weir
 C mouthpiece D Nozzle

24. The hydraulic mean depth or the hydraulic radius is the ratio of
 A area of flow and wetted perimeter B wetted perimeter and diameter of pipe
 C velocity of flow and area of flow D none of these
25. The magnitude of water hammer depends upon the
 A elastic properties of the pipe material B elastic properties of liquid flowing through the pipe
 C speed at which the valve is closed D all of the above
26. Bulk modulus of a fluid is the ratio of
 A shear stress to shear strain B increase in volume to the viscosity of fluid
 C increase in pressure to the volumetric strain D critical velocity to the viscosity of fluid
27. A flow is called sub-sonic, if the Mach number is
 A less than unity B unity
 C between 1 and 6 D more than 6
28. The ratio of the inertia force to the viscous force is called
 A Reynold's number B Froude's number
 C weber's number D Euler's number
29. An impulse turbine is used for
 A low head of water B high head of water
 C medium head of water D high discharge
30. A pelton wheel develops 1750kW under a head of 100 meters while running at 200 r.p.m. and discharging 2500 litres of water per second. The unit power of the wheel is
 A 0.25 kW B 0.75kW
 C 1.75 kW D 3.75 kW
31. Which of the following turbine is preferred for 0 to 25 m head of water?
 A Pelton wheel B Kalpan turbine
 C Francis turbine D none of these
32. A centrifugal pump will start delivering liquid only when the pressure rise in the impeller is equal to the
 A kinetic head B velocity head
 C manometric head D static head
33. First law of thermodynamics deals with
 A conservation of heat B conservation of momentum
 C conservation of mass D conservation of energy
34. The behavior of a perfect gas, undergoing any change in the variables which control physical properties, is governed by
 A Boyle's law B Charles's law
 C Gay-Lussac law D all of these
35. The absolute zero pressure will be
 A when molecular momentum of the system becomes zero B at sea level
 C at the temperature of -273K D at the centre of the earth
36. The sum of internal energy (U) and the product of pressure and volume (p.v) is known as
 A workdone B entropy
 C enthalpy D none of these

52. A large clearance volume in a reciprocating compressor results in
 A reduced volume flow rate B increased volume flow rate
 C lower suction pressure D lower delivery pressure
53. The stagnation pressure rise in a centrifugal compressor takes place
 A in the diffuser only B in the impeller only
 C in the diffuser and impeller D in the inlet guide vanes only
54. In a jet propulsion unit, the products of combustion after passing through the gas turbine are discharged into
 A atmosphere B vacuum
 C discharge nozzle D back to the compressor
55. The heat transfer from a hot body to a cold body is directly proportional to the surface area and difference of temperature between the two bodies. This statement is called
 A First law of thermodynamics B Newton's law of cooling
 C Newton's law of heating D Stefan's law
56. The critical radius is the insulation radius at which the resistance to heat flow is
 A maximum B minimum
 C zero D none of these
57. The automobile radiator is a heat exchanger of
 A parallel flow type B counter flow type
 C cross flow type D regenerator type
58. Fouling factor is used
 A in heat exchanger design as safety factor B in case of Newtonian fluids
 C when liquid exchanges heat with a gas D none of the above
59. The ratio of surface convection resistance to the internal conduction resistance is known as
 A Grashoff number B Biot number
 C Stanton number D Prandtl number
60. The ratio of Nusselt number and the product of Reynold's number and prandtl number is equal to
 A Stanton number B Biot number
 C Peclet number D Grashoff number
61. A boot-strap cooling system has
 A one heat exchanger B two heat exchangers.
 C three heat exchangers D four heat exchangers
62. The ratio of the maximum displacement of the forced vibration to the deflection due to the static force, is known as
 A damping factor B damping coefficient
 C logarithmic decrement D magnification factor
63. The factor which affects the critical speed of a shaft is
 A diameter of disc B span of shaft
 C eccentricity D all of these
64. A Hartnell governor is a
 A dead weight governor B pendulum type governor
 C spring loaded governor D inertia governor
65. The radial distance of a tooth from the pitch circle to the bottom of the tooth is called
 A dedendum B addendum
 C clearance D working depth

81. Let $f(x) = |x|$, $-2 \leq x \leq 2$; then
- A $f(x)$ is not continuous at $x=0$ and hence not differentiable
- B $f(x)$ is continuous at $x=0$ but not differentiable at $x=0$
- C $f(x)$ is continuous throughout but not differentiable at $x=1$
- D $f(x)$ is continuous and differentiable everywhere
82. The general solution of the differential equation $(D^2 - 2)^2 y = 0$ is
- A $y = (c_1 + c_2x)e^{\sqrt{2}x} + (c_3 + c_4x)e^{-\sqrt{2}x}$
- B $y = c_1e^{\sqrt{2}x} + c_2e^{\sqrt{2}x} + c_3e^{-\sqrt{2}x} + c_4e^{-\sqrt{2}x}$
- C $y = c_1e^{\sqrt{2}x} + c_2e^{-\sqrt{2}x}$
- D $y = (c_1 + c_2x + c_3x^2 + c_4x^3)e^{\sqrt{2}x}$
83. The value of the integral $\oint_C \frac{\cos z}{z - \pi} dz$, $C : |z - 1| = 3$ is
- A πi
- B $2\pi i$
- C $-\pi i$
- D $-2\pi i$
84. The approximate value of y at $x=0.2$ using Euler's method for the differential equation $\frac{dy}{dx} = x + y$, $y(0) = 1$, $h = 0.1$ is
- A 1.2
- B 1.36
- C 1.1
- D 1.22
85. Which of the following is TRUE for the matrices?
- A $|A \cdot B| = |A| \cdot |B|$
- B $(A \cdot B)^{-1} = A^{-1} \cdot B^{-1}$
- C $|A + B| = |A| + |B|$
- D $(A + B)^T \neq A^T + B^T$
86. In rolling two fair dice, the probability of getting equal number or numbers with an even product is
- A $6/36$
- B $27/36$
- C $30/36$
- D $3/36$
87. In Simpson's 1/3 rule, interval of integration is divided into subintervals. Number of these subintervals should be
- A Odd
- B Even
- C Multiple of 3
- D None of these

95. The Newton-Raphson formula for finding the square root of a real number R from the equation $x^2 - R = 0$ is

A $x_{i+1} = \frac{x_i}{2}$

B $x_{i+1} = \frac{1}{2} \left(x_i + \frac{R}{x_i} \right)$

C $x_{i+1} = \frac{3x_i}{2}$

D $x_{i+1} = \frac{1}{2} \left(3x_i - \frac{R}{x_i} \right)$

96. $L \left(\frac{1}{\sqrt{t}} \right)$ is

A $\frac{\pi}{\sqrt{s}}$

B $\frac{\sqrt{\pi}}{s}$

C $\sqrt{\frac{\pi}{s}}$

D $\frac{1}{\sqrt{2s}}$

97. The solution of the differential equation $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} = 0$ is

A $y = c_1 + c_2 \log x$

B $y = c_1 \log x$

C $y = c_1 + c_2 x$

D $y = (c_1 + c_2 x)e^x$

98. If A and B are independent events, then which of the following is FALSE?

A $P(A/B) = P(A)$

B $P(A \cap B) = P(A)P(B)$

C $P(B/A) = P(B)$

D None of these

99. $L^{-1} \log \left(\frac{s+b}{s+a} \right)$ is

A $\frac{e^{-at} - e^{-bt}}{t}$

B $\frac{e^{-bt} - e^{-at}}{t}$

C $\frac{e^{at} - e^{bt}}{t}$

D $\frac{e^{bt} - e^{at}}{t}$

100.

A 3×3 matrix has eigen values 1, 0, 2. Which is TRUE of the following?

A Trace of A = 0

B A^{-1} does not exist

C A is not diagonalizable

D None of these