## PGCET-2018

## SUB: MECHANICAL ENGINEERING (ME)

## Seat No.

$\qquad$

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
6. 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
7. 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
8. The unit of moment of inertia of an area is
A $\mathrm{kg}-\mathrm{m}^{2}$
B $\mathrm{kg}-\mathrm{m}-\mathrm{s}^{2}$
C $\mathrm{kg} / \mathrm{m}^{2}$
D $\mathrm{m}^{4}$
9. Moment of inertia of a circular section about its diameter(d) is
A $d^{3} / 16$
B $\quad d^{3} / 32$
C $\quad d^{4} / 32$
D $\quad d^{4} / 64$
10. 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
11. The bodies which rebound after impact are called
A inelastic bodies
B elastic bodies
C neither elastic nor inelastic bodies
D none of these
12. The ratio of linear stress to linear strain is called
A modulus of rigidity
B modulus of elasticity
C bulk modulus
D poissonố ratio
13. 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
14. 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 Youngê modulus
B modulus of rigidity
C bulk modulus
D Poissonố ratio
15. The extremeties of any diameter on Mohrố circle represent
A principal stresses
B normal stresses on plane at $45^{\circ}$
C shear stresses on plane at $45^{\circ}$
D normal and shear stresses on a plane
16. 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
17. 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
18. A spring is used to absorb shocks and vibrations is
A conical spring
B torsion spring
C leaf spring
D disc spring
19. 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
20. 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
21. 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 paricle 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 Bernoulliô equation
C Pascalố law
D Archimedeố 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
D discharge through a pipe 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
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 Reynoldố number
B Froude $\widehat{~}$ number
C weberố number
D Eulerố 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 1750 kW under a head of 100 meters while running at $200 \mathrm{r} . \mathrm{p} . \mathrm{m}$. and discharging 2500 litres of water per second. The unit power of the wheel is
A 0.25 kW
B $\quad 0.75 \mathrm{~kW}$
C $\quad 1.75 \mathrm{~kW}$
D $\quad 3.75 \mathrm{~kW}$
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 Boyleô law
B Charlesôlaw
C Gay-Lussac law
D all of these
35. The absolute zero pressure will be
A when molecular momentum of the
B at sea level system becomes zero
D at the centre of the earth
36. The sum of internal energy $(\mathrm{U})$ and the product of pressure and volume (p.v) is known as
A workdone
B entropy
C enthalpy
D none of these
37. A process, in which the gas is heated or expanded in such a way that the product of its pressure and volume remains constant, is called
A isothermal process
B hyperbolic process
C adiabatic process
D polytropic process
38. The compression ratio for diesel engine is
A 3 to 6
B 5 to 8
C 15 to 20
D 20 to 30
39. The gas in cooling chamber of a closed cycle gas turbine is cooled at
A constant volume
B constant temperature
C constant pressure
D none of these
40. Which of following has the highest calorific value?
A Peat
B Lignite
C Bituminous coal
D Anthracite coal
41. Water tube boilers are
A internally fired
B externally fired
C internally as well as externally fired
D none of these
42. The forced circulation of water does not take place in
A La-Mont boiler
B Lancashire boiler
C Velox boiler
D Benson boiler
43. A safety valve usually employed with stationary boilers is
A lever safety valve
B dead weight safety valve
C high steam and low water safety
D all of these valve
44. A condenser where circulating water flows through tubes which are surrounded by steam, in known as
A surface condenser
B jet condenser
C barometric condenser
D evaporative condenser
45. The critical pressure gives the velocity of steam at the throat
A equal to the velocity of sound
B less than velocity of sound
C more than the velocity of sound
D none of these
46. The difference of supersaturated temperature and saturation temperature at that pressure is called
A degree of supersaturation
B degree of superheat
C degree of undercooling
D none of these
47. The expansion of steam, as it flows over the blades in reaction turbine, represents
A isothermal process
B isentropic process
C throttling process
D free-expansion process
48. Multi-stage steam turbines are of the
A velocity compounded type
B reaction type
C pressure compounded type
D all of these
49. The compression ignition engines are governed by
A hit and miss governing
B qualitative governing
C quantitative governing
D combination of (B) and (C)
50. The knocking in spark ignition engines can be reduced by
A retarding the spark
B increasing the engine speed
C both (A) and (B)
D none of these
51. The octane number of petrol, generally available, is
A 20 to 40
B 40 to 60
C 40 to 60
D 80 to 100
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 Newtonô law of cooling
C Newton $\hat{Q}$ law of heating
D Stefanố 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
B in case of Newtonian fluids factor
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 Reynoldô 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
66. Which of the following is an antifriction bearing?
A journal bearing
B pedestal bearing
C collar bearing
D needle bearing
67. A key made from a cylindrical disc having segmental cross-section, is known as
A feather key
B gib-head key
C wood ruff key
D flat saddle key
68. The percentage of carbon in cast iron varies from
A 0.1 to 0.5
B $\quad 0.5$ to 1
C 1 to 1.7
D $\quad 1.7$ to 4.5
69. Micro-structure of material is, generally, examined by
A naked eye
B optical microscope
C X-ray technique
D none of these
70. Which of the following welding process uses non-consumable electrodes?
A TIG welding
B MIG welding
C Manual arc welding
D Submerged arc welding
71. In arc welding, the temperature of heat produced by the electric arc is of the order of
A $3000^{\circ} \mathrm{C}$ to $4000^{\circ} \mathrm{C}$
B $\quad 4000^{\circ} \mathrm{C}$ to $5000^{\circ} \mathrm{C}$
C $5000^{\circ} \mathrm{C}$ to $6000^{\circ} \mathrm{C}$
D $\quad 6000^{\circ} \mathrm{C}$ to $7000^{\circ} \mathrm{C}$
72. The operation of cutting a cylindrical hole in a sheet of metal by the punch and die is called
A shearing
B piercing
C punching
D blanking
73. Dielectric is used in
A electro-chemical machining
B ultra-sonic machining
C electro-discharge machining
D laser machining
74. A drill considered as a cutting tool having zero rake, is known as a
A flat drill
B straight fluted drill
C parallel shank twist drill
D tapered shank twist drill
75. Lathe bed is made of
A mild steel
B alloy steel
C pig iron
D chilled cast iron
76. CPM stands for
A Combined Process Method
B Critical Path Method
C Common Planning Method
D Critical Process Method
77. Quenching theory is used for
A job-shop scheduling
B inventory problems

C traffic congestion studies
D all of these
78. The starter motor is driven by
A chain drive
B gear drive

C flat belt drive
D V-belt drive
79. The condition that results in large quantities of CO emission is
A insufficient air during combustion
B insufficient fuel during combustion
C low temperature combustion
D high temperature combustion
80. The process of removing the burnt gases from the engine cylinder by fresh charge coming into the engine cylinder from the crank-case, is known as
A cleaning
B priming
C scavenging
D Detonation
81. Let $f(x)=|x|,-2 \leq x \leq 2$; then
A $\quad f(x)$ is not continuous at $x=0$ and hence not differentiable
B $\quad f(x)$ is continuous at $x=0$ but not differentiable at $x=0$
C $\quad f(x)$ is continuous throughout but not differentiable at $x=1$
D $\quad f(x)$ is continuous and differentiableeverywhere
82. The general solution of the differential equation $\left(D^{2}-2\right)^{2} y=0$ is
A $y=\left(c_{1}+c_{2} x\right) e^{\sqrt{2} x}$

$$
+\left(c_{3}+c_{4} x\right) e^{-\sqrt{2} x}
$$

B
$y=c_{1} e^{\sqrt{2} x}+c_{2} e^{\sqrt{2} x}+c_{3} e^{-\sqrt{2} x}+c_{4} e^{-\sqrt{2} x}$
C $y=c_{1} e^{\sqrt{2} x}+c_{2} e^{-\sqrt{2} x}$
D $y=\left(c_{1}+c_{2} x+c_{3} x^{2}+c_{4} x^{3}\right) e^{\sqrt{2} x}$
83.

The value of the integral $\oint_{C} \frac{\cos z}{z-\pi} d z, C:|z-1|=3$ is
A $\pi i$
B $2 \pi i$
C $-\pi i$
D $-2 \pi i$
84. The approximate value of $y$ at $x=0.2$ using Eulerôs method for the differential equation $\frac{d y}{d x}=x+y, y(0)=1, h=0.1$ is
A 1.2
B 1.36
C 1.1
D 1.22
85. Which of the following is TRUE for the matrices?
A $\quad|A \cdot B|=|A| \cdot|B|$
B $\quad(A \cdot B)^{-1}=A^{-1} \cdot B^{-1}$
C $\quad|A+B|=|A|+|B|$
D $\quad(A+B)^{T} \neq A^{T}+B^{T}$
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 Simpsonô $1 / 3$ 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
88.

The integrating factor of the differential equation $\frac{d y}{d x}+\frac{x}{1+x} y=1+x$ is
A $e^{x}$
B $\quad e^{x}(1+x)$
C $\frac{e^{x}}{1+x}$
D $e^{x+x^{2} / 2}$
89. A necessary and sufficient condition that line integral $\oint_{C} \vec{A} \cdot \overrightarrow{d r}=0$ for every closed curve $C$ is that
A $\quad \operatorname{div} \vec{A}=0$
B $\operatorname{curl} \vec{A}=0$
C $\quad \operatorname{div} \vec{A} \neq 0$
D $\operatorname{curl} \vec{A} \neq 0$
90. If $u=x^{3} e^{-\frac{x}{y}}$ then $x^{2} \frac{\partial^{2} u}{\partial x^{2}}+2 x y \frac{\partial^{2} u}{\partial x \partial y}+y^{2} \frac{\partial^{2} u}{\partial y^{2}}$ is
A $3 u$
B $9 u$
C $6 u$
D $-u$
91. The value of $\int_{C}\left(y^{2} d x+x^{2} d y\right)$ where $C$ is the boundary of the square $-1 \leq x \leq 1,-1 \leq y \leq 1$
A 0
B 4
C $2(x+y)$
D $4 / 3$
92. The function $2 x-x^{2}+p y^{2}$ is harmonic if $p$ equals to
A 3
B 0
C 1
D 2
93. The pair of linear equations $k x+3 y+1=0,2 x+y+3=0$ has exactly one solution if
A $\quad k=6$
B $\quad k$ has any value
C $k \neq 6$
D None of these
94. Minimum value of $x^{2}+y^{2}+6 x+14$ is
A 5
B 14
C 0
D -3
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 $\quad x_{i+1}=\frac{1}{2}\left(x_{i}+\frac{R}{x_{i}}\right)$
C
$x_{i+1}=\frac{3 x_{i}}{2}$
D

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

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

$$
\frac{1}{\sqrt{2 S}}
$$

97. 

The solution of the differential equation $x^{2} \frac{d^{2} y}{d x^{2}}+x \frac{d y}{d x}=0$ is
A $y=c_{1}+c_{2} \log x$
B $y=c_{1} \log x$
C $y=c_{1}+c_{2} x$
D $y=\left(c_{1}+c_{2} x\right) e^{x}$
98. If A and B are independent events, then which of the following is FALSE?
A $\quad P(A / B)=P(A)$
B $\quad P(A \cap B)=P(A) P(B)$
C $\quad P(B / A)=P(B)$
D None of these
99.
$L^{-1} \log \left(\frac{s+b}{s+a}\right)$ is
A

B

C $\frac{e^{a t}-e^{b t}}{t}$
D

100.

A $3 \times 3$ matrix has eigen values $1,0,2$. Which is TRUE of the following?
A Trace of $\mathrm{A}=0$
B $\quad A^{-1}$ does not exist
C A is not diagonalizable
D None of these

