

PGCET-2022

Seat No. _____

SUB: MECHANICAL ENGINEERING

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.	Effect of a force on a body depends			
	A	magnitude	B	direction
	C	line of action or position	D	all of above
2	The unit of work or energy in S.I. units is			
	A	newton	B	joule
	C	watt	D	Kilogram meter
3	The possible loading in various members of framed structure are			
	A	Compression or tension	B	Shear or tension
	C	Bucking or shear	D	Bending
4	The co-efficient of friction depends upon			
	A	Nature of surface	B	Area of contact
	C	Shape of surface	D	(a) And (b)
5	The product of mass and velocity is known as			
	A	Work	B	Impulse
	C	Moment	D	Momentum
6	The ratio of shear modulus to modulus of elasticity if poisson's ratio is 0.25 will be			
	A	0.4	B	0.25
	C	4	D	0.5
7	Torsional rigidity of a solid circular shaft of diameter 'd' is proportional to			
	A	d	B	d^2
	C	d^4	D	$d/2$

8	Bending moment at any pint is equal to algebraic sum of			
	A	All vertical forces	B	Forces on either side of the point
	C	All horizontal forces	D	Moments of forces on either side of the point
9	Principal plane is one which carries			
	A	No shear stress	B	Maximum shear stress
	C	No normal stress	D	Maximum resultant of stress
10	The extremities of any diameter on Mohr's circle represent			
	A	Principal stresses	B	Shear stresses on planes at 45°
	C	Normal stresses on planes at 45°	D	None of the above
11	If two moving elements have surface contact in motion such pair is known as			
	A	Sliding pair	B	Lower pair
	C	Surface pair	D	Higher pair
12	A slider crank chain consists of following number of turning and sliding pairs			
	A	3,1	B	2,2
	C	1,3	D	4,3
13	Two system shall be dynamically equivalent when			
	A	The mass of two are same	B	M.I of two about an axis through C.G is equal
	C	C.G of two coincides	D	All of above
14	Cam size depends upon			
	A	Base circle	B	Pitch circle
	C	Prime circle	D	Outer circle
15	The ratio of numeric of teeth and pitch circle diameter is called			
	A	Pitch	B	Module
	C	Diametral pitch	D	Circular pitch
16	An involute gear should have minimum of			
	A	8 teeth	B	12 teeth
	C	16 teeth	D	32teeth

17	The bulking load depends on			
	A	Cross sectional area	B	Modules of elasticity
	C	Slenderness ratio	D	All of above
18	A boiler plate thickness is 20mm. The rivet diameter will be			
	A	20 mm	B	10 mm
	C	40 mm	D	30 mm
19	Factor of safety is the ratio of			
	A	Yield stress/working stress	B	Tensile stress/working stress
	C	Compressive stress/working stress	D	Bearing stress/working stress
20	The following type of nut is used with allen bolt			
	A	Allen nut	B	Hexagonal nut
	C	Slotted nut	D	Any one of above
21	One hertz equal to			
	A	1 cycles per second	B	1.5 cycles per second
	C	2 cycles per second	D	2.5 cycles per second
22	Identify a forced vibration			
	A	Pulling a child back on a swing	B	Vibration of a building due to earthquake
	C	Vibration of a vehicle on an uneven road	D	All of above
23	Damping force is proportional to the			
	A	Displacement	B	Velocity
	C	Acceleration	D	None
24	What is the effect of rotating mass of a shaft on a system?			
	A	Bending the shaft	B	Break the shaft
	C	Compress the shaft	D	Extend the shaft
25	At which angle primary unbalanced force in reciprocating engine mechanism is maximum?			
	A	180°	B	45°
	C	0°	D	90°

26	Kinematic of viscosity is depend on			
	A	Density	B	Velocity
	C	Flow	D	Pressure
27	The unit of dynamic or absolute viscosity are			
	A	Meters ² / sec	B	Newton-sec / Meters ²
	C	Kg sec / meter	D	None of the above
28	If the particles of a fluid attain such velocity that velocity vary from point to point in magnitude and direction as well as from instant to instant, the flow is said to be			
	A	Disturbed flow	B	Turbid flow
	C	Turbulent flow	D	Non steady flow
29	Any fluid flow follows			
	A	Continuity equation	B	Bernoulli's equation
	C	Newton's law of viscosity	D	Darcy's equation
30	Rota meter is used to measure			
	A	Rotation	B	Viscosity
	C	Flow	D	Velocity
31	Heat transfer takes place as per			
	A	First law of thermodynamics	B	Second law of thermodynamics
	C	Third law of thermodynamics	D	Fourth law of thermodynamics
32	Total heat is the heat required to			
	A	Change vapour into liquid	B	Change liquid into vapour
	C	Convert water into steam and superheat it	D	Convert saturated steam into dry steam
33	Thermal diffusivity is			
	A	A dimensionless parameter	B	Physical property of material
	C	Used as a mathematical model	D	Useful in case of heat transfer by radiation
34	Emissivity of a white polished body in comparison to a black body is			
	A	Lower	B	Higher
	C	Same	D	Depends upon the shape of the body

35	LMTD in case of counter flow heat exchanger as compared to parallel flow heat exchanger			
	A	Lower	B	Higher
	C	Depends on temperature conditions	D	Depends on the area of heat exchanger
36	At thermal equilibrium			
	A	Absorptivity is equal to emissivity	B	Absorptivity is higher than emissivity
	C	Absorptivity is lower than emissivity	D	Sum of absorptivity and emissivity s unity
37	Heat energy stored in the gas and used for raising temperature of a gas is known as			
	A	thermal energy	B	enthalpy
	C	internal energy	D	molecular energy
38	Minimum work in compressor is possible when the value of adiabatic index γ is equal to			
	A	0.75	B	2
	C	1	D	1.35
39	Gas laws are applicable to			
	A	Gases as well as vapour	B	Gases and steam
	C	Gases alone and not to vapour	D	steam and vapour
40	The first law of thermodynamics is the law of			
	A	conversion of mass	B	conversion of energy
	C	conversion of heat	D	conversion of temperature
41	The specific heat of air increases with increase in			
	A	temperature	B	pressure
	C	Air flow	D	both temperature and pressure
42	The maximum temperature in the I. C. cylinder is of the order of			
	A	500-1000°C	B	2500-3000°C
	C	1500-2000°C	D	2000-2500°C
43	The automobile generally utilize batteries having voltage of			
	A	3V	B	6V
	C	12 V	D	24V

44	Thermal efficiency of a thermal power plant is of the order of			
	A	15%	B	45%
	C	30%	D	20%
45	Chemical formula of Freon 12 is			
	A	$\text{C Cl}_2 \text{ F}_2$	B	$\text{C Cl}_2 \text{ F}_3$
	C	$\text{C Cl}_3 \text{ F}_2$	D	C Cl F_2
46	In a vapour compression cycle the lowest temperature occurs in			
	A	Receiver	B	Condenser
	C	Evaporator	D	Expansion valve
47	Dry bulb temperature depends on			
	A	Humidity of air	B	Water vapour content of air
	C	Condition of air	D	None of above
48	Air fuel ratio of gas turbine is closer to			
	A	10:1	B	60:1
	C	20:1	D	15:1
49	In taper roller bearing the contact angle is			
	A	Between 5° and 10°	B	Between 12° and 15°
	C	Between 1° and 3°	D	Zero
50	Oil consumption excessive			
	A	Piston rings worn out	B	Valve timing defective
	C	Lubricating oil level too high	D	Leaks at gaskets or seals
51	Melting point of iron is			
	A	1539°C	B	1131°C
	C	1712°C	D	1601°C
52	Which of the following is the most ductile material			
	A	Mild steel	B	Aluminum
	C	Zinc	D	Nickel

53	Which of the following constituents of steels is softest and least strong			
	A	Austenite	B	Pearlite
	C	Ferrite	D	Cementite
54	The hardening strains are reduced and the toughness of the part increased by the following process after hardening			
	A	Annealing	B	Tempering
	C	Normalizing	D	Case hardening
55	Which of the following casting methods utilizes wax pattern			
	A	Investment casting	B	Slush casting
	C	Shell casting	D	Die casting
56	Which of the following materials has more shrinkage allowance			
	A	Cast iron	B	Lead
	C	Steel	D	Aluminum alloy
57	The purpose of gate is to			
	A	Act as reservoir for molten metal	B	Feed the casting at a rate consistent with the rate of solidification
	C	Feed molten metal from pouring basin to gate	D	None of above
58	Electrode gets consumed in the flowing welding process			
	A	Gas	B	Resistance
	C	TIG	D	Arc
59	Binding wire used to support the joints for soldering is made of			
	A	Aluminum	B	Tin
	C	Copper	D	Soft iron
60	Seam welding is			
	A	Arc welding	B	TIG welding
	C	Resistance welding	D	Arc welding with reverse polarity

61	Oxygen to acetylene ratio in case of neutral fame is			
	A	0.8:1.0	B	1:1
	C	1.2:1	D	2:1
62	Clearance in mm =			
	A	$C = 0.0032t \sqrt{fs}$	B	$C = 0.0023t \sqrt{fs}$
	C	$C = 0.023t \sqrt{fs}$	D	$C = 0.032t \sqrt{fs}$
63	Find incorrect press name.			
	A	screw press	B	cam press
	C	guide press	D	eccentric press
64	Shearing force $F = L t f_s$, where L is			
	A	area	B	perimeter
	C	volume	D	mass
65	How many punch and die sets in progressive die?			
	A	1	B	2
	C	0	D	None of above
66	MUF in presswork is used for			
	A	Material Utilization Factor	B	Mass Utilization Factor
	C	Material Utilization Force	D	Machining Utilization Factor
67	_____ is the locating system of cube.			
	A	3-2-1	B	1-2-3
	C	2-3-1	D	3-1-2
68	$T_1/T_2 = L_2/L_1$ of chip formation is possible because of assumption as ____.			
	A	$B_1 < B_2$	B	$B_1 > B_2$
	C	$B_1 = B_2$	D	$B_1 * B_2 = 1$
69	Which is the most important process parameters in AJM			
	A	Nozzle material	B	Nozzle distance from job
	C	Nozzle color	D	Nozzle shape

70	_____ is not a laser.		
	A	Ruby	B Nd glass
	C	CO2	D Pm glass
71	Which is tool life equation.		
	A	$VT^n=C$	B $CT^n=V$
	C	$CT^n=V$	D $T=CV^n$
72	Graphical method, simplex method and transportation method are concerned with		
	A	Queing theory	B Liner programing
	C	Material handling	D Break even analysis
73	Routing is essential in the following type of industry		
	A	Process industry	B Job order industry
	C	Assembly industry	D Mass production industry
74	PERT has following time estimate		
	A	One time estimate	B Three time estimate
	C	Two time estimate	D Nil time estimate
75	EOQ is		
	A	Economical order quantity	B Extra order quantity
	C	Equal order quantity	D None of above
76	Rotary encoder is		
	A	Feedback device at CNC	B Device at rotary pump
	C	Coding device at EDM	D None of above
77	Surface modeling is at		
	A	Surface inspection	B Surface masking
	C	CAD modeling	D None of above
78	Why tolerance are given to the parts?		
	A	Because it's impossible to make perfect setting	B To reduce weight of component
	C	To reduce cost of assembly	D To reduce amount of material used

79	Quality control chart doesn't depend on which factors?			
	A	Normal distribution	B	Binomial distribution
	C	Random sampling	D	Independence between sample
80	Go 'limit' applied to which limit condition?			
	A	Maximum material limit	B	Lower limit of shaft and upper limit of hole
	C	Minimum material limit	D	Moderate material limit
81.	Solution of differential equation $x^2 \frac{dy}{dx} + 2xy = x^2$ is given by.			
	A	$y = \frac{x^3}{3} + c$	B	$yx^2 = x + c$
	C	$yx^2 = \frac{x^3}{3} + c$	D	$y = \frac{x^2}{3} + c$
82.	Solution of differential equation $\frac{d^2y}{dx^2} - 15\frac{dy}{dx} + 54y = e^{2x}$ is given by.			
	A	$y = c_1 e^{-9x} + c_2 e^{-6x} + \frac{1}{28} e^{2x}$	B	$y = c_1 e^{9x} + c_2 e^{6x} + \frac{1}{28} e^{2x}$
	C	$y = c_1 e^{-9x} + c_2 e^{-6x} + e^{2x}$	D	$y = c_1 e^{9x} + c_2 e^{6x} + e^{2x}$
83.	Laplace Transformation of $t \sin 7t$ is equal to.			
	A	$\frac{14s}{(s^2 + 7)}$	B	$\frac{s}{(s^2 + 7)^2}$
	C	$\frac{14s}{(s^2 + 49)^2}$	D	$\frac{14s}{(s^2 + 7)^2}$
84.	Inverse Laplace Transformation of $\frac{s}{(s^4 + s^2)}$ is equal to			
	A	$1 - \cos t$	B	$t - \cos t$
	C	$t \cos t$	D	$1 - \sin t$
85.	$\lim_{x \rightarrow 0} \frac{2 \sin x - \sin 2x}{x^3}$ is equal to.			
	A	0	B	$\frac{1}{2}$
	C	2	D	1
86.	If $U = \cos^{-1} \left(\frac{x^2 + y^2}{x - y} \right)$ then $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y}$ is equal to			
	A	$\sin U$	B	$\cos U$

	C	$-\cot U$	D	$3U$
87.	Vector Field $\vec{F} = 5zi + 6j + 5xk$ is			
	A	Irrotational and Solenoidal vector field	B	Irrotational vector field
	C	Solenoidal vector Field	D	None of these
88.	What is the work done when force $\vec{F} = (2xy + z^3)i + x^2j + 3xz^2k$ moves particle from point (1,-2,1) to (3,1,4)? (\vec{F} is a conservative vector field)			
	A	100	B	200
	C	101	D	202
89.	Which of the following is correct for the system $x - y + 2z = 4, \quad 3x + y + 4z = 6, \quad x + y + z = 1$			
	A	Unique solution	B	Infinitely many solutions
	C	System is consistence	D	None of(A), (B) and (C) holds
90.	If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 5 & 1 \\ 0 & 0 & 3 \end{bmatrix}$ then an Eigen values of A^{-1} are			
	A	1,9,25	B	1,3,5,
	C	$\frac{1}{3}, \frac{1}{5}, \frac{1}{2}$	D	$1, \frac{1}{3}, \frac{1}{5}$
91.	If $A = \begin{bmatrix} 12 & 24 & 36 \\ 6 & 12 & 18 \\ 3 & 6 & 9 \end{bmatrix}$ then rank of the matrix is.			
	A	1	B	0
	C	2	D	3
92.	If $f(z) = \frac{z^2 - 1}{(z-3)(z^2 - 2z + 1)}$ which is the points where $f(z)$ fails to be analytic ?			
	A	1,2		1,3
	C	-1,-3		1,-3
93.	Value of $\int_c \frac{z}{z-1} dz$, (where c is $ z = 2$) is equal to.			
	A	0	B	πi
	C	$3\pi i$	D	$2\pi i$
94.	Residue of $f(z) = \frac{z^2}{(z+1)(z+3)}$ at pole -1 is equal to.			

	A	-2	B	$\frac{1}{2}$
	C	2	D	1
95.	What is the Mean, Median and mode of 10, 12, 13, 5, 10 are.			
	A	Mean=10, Median=5, Mode= 5	B	Mean=5, Median=10, Mode= 5
	C	Mean=10, Median=5, Mode= 10	D	Mean=10, Median=10, Mode= 10
96.	In a bolt manufacturing company. It is found that there is a small chance 0.05 for any bolt to be defective. What is the Mean and Standard deviation of the binomial distribution of defective bolt in a total of 1000 ?.			
	A	50, 8.69	B	50, 9
	C	50, 6.89	D	50, 9.68
97.	There are 5 yellow, 2 red and 3 white balls are in the box. Three balls are randomly selected from the box. What is the probability that all are of same colour ?			
	A	0.09	B	0.91
	C	0.069	D	0.08
98.	Value of $\int_0^5 \frac{1}{5+4x} dx$ with $h = 0.5$ by Simpsons $\frac{1}{3}$ rule is.			
	A	0.2046	B	0.6423
	C	0.4026	D	0.2506
99.	Using Newton- Raphson method what is the value of $\sqrt{10}$, correct upto two decimal places.			
	A	3.61	B	3.162
	C	3.71	D	3.29
100.	The area enclosed by the curve $r = a(1 - \cos\theta)$ is given by			
	A	$8a^2$	B	$2\pi a^2$
	C	$4a^2$	D	πa^2