

**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.	The processes or systems that do not involve heat are called			
	A	isothermal processes	B	equilibrium processes
	C	steady processes	D	adiabatic processes
2.	The gas constant ( $R$ ) is equal to the			
	A	sum of two specific heats	B	difference of two specific heats
	C	product of two specific heats	D	ratio of two specific heats
3.	The air standard Otto cycle comprises			
	A	two constant pressure processes and two constant volume processes	B	two constant pressure and two constant entropy processes
	C	two constant volume processes and two constant entropy processes	D	none of the above.
4.	In a two-stroke engine, one power stroke is obtained in			
	A	one revolution of the crank shaft	B	two revolutions of the crank shaft
	C	four revolutions of the crank shaft	D	none of the above
5.	Which one of the following is true for a Diesel engine?			
	A	It has high compression ratio	B	It does not have a spark plug
	C	It has large noise and vibrations	D	All of the above
6.	A reciprocating compressor handles			
	A	large volume for high pressure ratio	B	large volume for low pressure ratio
	C	small volume for high pressure ratio	D	small volume for low pressure ratio

7.	In a centrifugal compressor, the increase in pressure is due to			
	A	back flow of air	B	dynamic action
	C	intermittent flow	D	reduction in volume
8.	One tonne refrigerating machine means that			
	A	one tonne is the total mass of the machine	B	one tonne of refrigerant is used
	C	one tonne of water can be converted into ice	D	one tonne of ice when melts from and at 0°C in 24 hours, the refrigeration effect produced is equivalent to 211 kJ/min.
9.	Reversed Carnot cycle comprises			
	A	two isentropic processes and two adiabatic processes	B	two isentropic processes and two isothermal processes
	C	two isentropic processes and two constant pressure processes	D	two isentropic processes and two constant volume processes.
10.	The efficiency of the Carnot cycle may be increased by			
	A	decreasing the highest temperature	B	increasing the lowest temperature
	C	keeping the lowest temperature constant	D	decreasing the lowest temperature
11.	5/2 way single solenoid valve has			
	A	2 ports 2 position	B	5 ports 2 position
	C	5 ports 5 position	D	2 ports 5 position
12.	Which of the following is advantage of pneumatics?			
	A	Action is fast	B	Components are cheaper and simple in design
	C	Air does not ignite	D	All of the above
13.	The type of gears used to connect two non-parallel non-intersecting shaft are			
	A	spur gear	B	helical gear
	C	spiral gear	D	none of these
14.	The component of the acceleration, parallel to the velocity of the particle, at the given instant is called			
	A	radial component	B	tangential component
	C	coriolis component	D	centripetal
15.	When two pulleys of different diameters are connected by means of an open belt drive, then the angle of contact taken into consideration should be of the			
	A	smaller pulley	B	larger pulley

	C	Difference of two pulley	D	average of two pulleys
16.	When the belt is stationary, it is subjected to some tension, known as initial tension. The value of this tension is equal to the			
	A	tension in the tight side of the belt	B	tension in the slack side of the belt
	C	sum of the tensions in the tight side and slack side of the belt	D	average tension of the tight side and slack side of the belt
17.	Interference can be avoided in involute gears with 20° pressure angle by			
	A	using more than 20 teeth	B	using as small number of teeth as possible
	C	cutting involute correctly	D	using more than 8 teeth
18.	When the axes of first and last gear are co-axial, then gear train is known as			
	A	simple gear train	B	compound gear train
	C	reverted gear train	D	epicyclic gear train
19.	Material used for machine tool bed is			
	A	cast iron	B	alloy steel
	C	mild steel	D	high carbon steel
20.	Mild steel contains			
	A	Less than 0.3% carbon	B	0.3 % to 0.5 % carbon
	C	0.5 % to 1 % carbon	D	More than 3% carbon
21.	A steel with 0.8 per cent carbon is known as			
	A	eutectoid steel	B	hypereutectoid steel
	C	hypoeutectoid steel	D	none of these
22.	Shock resistance of steel is increased by adding			
	A	nickel	B	chromium
	C	nickel and chromium	D	sulphur, lead and phosphorus
23.	The type of stresses developed in the key is/are			
	A	shear stress alone	B	both shear and crushing stresses
	C	bearing stress alone	D	shearing, bearing and bending stresses
24.	When a shaft is subjected to a bending moment $M$ and a twisting moment $T$ , then the equivalent twisting moment is equal to			
	A	$M + T$	B	$M^2 + T^2$
	C	$\sqrt{M^2 + T^2}$	D	$M^2 - T^2$

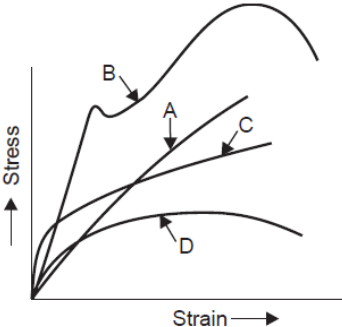
25.	All the types of levers are subjected to			
	A	twisting moment	B	bending moment
	C	direct axial load	D	combined twisting and bending moment
26.	Slenderness ratio is the ratio of			
	A	maximum size of a column to minimum size of column	B	width of column to depth of column
	C	effective length of column to width of column	D	effective length of column to least radius of gyration of the column
27	A screw jack has square threads and the lead angle of the thread is $\alpha$ . The screw jack will be self locking when the coefficient of friction ( $\mu$ ) is			
	A	$\mu > \tan \alpha$	B	$\mu = \cot \alpha$
	C	$\mu < \tan \alpha$	D	$\mu > \operatorname{cosec} \alpha$
28	In order to find the maximum bending moment on the arms, it is assumed as a			
	A	simply supported beam carrying a uniformly distributed load over the arm	B	fixed at both ends ( <i>i.e.</i> at the hub and at the free end of the rim) and carrying a uniformly distributed load over the arm
	C	cantilever beam fixed at the hub and carrying a concentrated load at the free end of the rim	D	none of the above
29	Stored energy of an inductance is dependent upon its			
	A	instantaneous voltage only	B	instantaneous current only
	C	instantaneous voltage and history of its current	D	instantaneous current and history of its voltage
30	Three resistances of value R ohms each are connected in star. Its equivalent delta will comprise three resistances of value			
	A	$R/3$ each	B	3 R each
	C	R each	D	3R, R, $R/3$
31	The sum of instantaneous power in a balanced three-phase system is			
	A	constant	B	constant plus a second-harmonic oscillating component
	C	constant plus a fundamental oscillating component	D	constant plus a third-harmonic oscillating component
32	The unit of flux density is			
	A	Tesla	B	$\text{AT/m}^2$
	C	$\text{Wb/m}^2$	D	All three are equivalent

33	In a transformer, the flux phasor			
	A	leads the induced emf phasor by $90^\circ$	B	lags the induced emf phasor by $90^\circ$
	C	is in phase with the induced emf phasor	D	is in phase opposition to the induced emf phasor
34	The power drawn by a dc shunt motor on no-load comprises			
	A	iron loss only	B	mechanical loss only
	C	iron loss and mechanical loss	D	copper loss only
35	The stator and rotor of an induction machine act like			
	A	an ordinary rotor-winding transformer	B	a variable frequency transformer with fixed frequency
	C	a variable voltage transformer with fixed frequency	D	a variable frequency and voltage transformers with V/f remaining constant
36	Which of the following meters has the best accuracy?			
	A	Moving-iron meter	B	Moving-coil meter
	C	Rectifier-type meter	D	Thermocouple meter
37	Dielectric loss can be measured by			
	A	an energy meter	B	an electrostatic meter
	C	the Wheatstone bridge	D	none of the above
38	A zener diode			
	A	is useful as an amplifier	B	has a negative resistance
	C	has a high forward voltage	D	has a sharp breakdown at low reverse voltage
39	In an LED, light emission occurs because			
	A	light gets reflected due to lens action	B	light falling on the diode gets amplified
	C	diode gets heated up	D	recombination of charge carriers takes place
40	When the collector junction in transistors is biased in the reverse direction and the emitter junction in forward directions, the transistor is said to be in the			
	A	cut-off region	B	saturation region
	C	active region	D	none of these
41	Which of the following techniques is used for biasing the enhancement-type MOSFET?			
	A	Voltage-divider bias	B	Collector-feedback bias
	C	Current-source bias	D	Self-bias

42	The voltage gain of a common-base amplifier is			
	A	greater than unity	B	zero
	C	unity	D	less than unity
43	An op-amp has			
	A	very small input resistance and very large output resistance	B	very small input resistance and very small output resistance
	C	very large input resistance and very small output resistance	D	very large input resistance and very large output resistance
44	The primary advantage of a crystal oscillator is that			
	A	it operates on a very low dc supply voltage	B	its frequency of oscillation remains constant
	C	it gives a high output voltage	D	it can oscillate at any frequency
45	How many NAND gates will require to implement an AND gate?			
	A	2	B	3
	C	4	D	5
46	NAND and NOR are called universal gates because			
	A	they have least propagation delay	B	they are available every where
	C	all the other gates can be implemented using these gates	D	they are easy to process
47	Binary representation of the decimal number 25 is			
	A	10001	B	11001
	C	11101	D	10110
48	The 8085 microprocessor is a			
	A	40-PIN IC	B	32-PIN IC
	C	28-PIN IC	D	24-PIN IC
49	In PLC, for sensing the temperature in any processing line, a temperature sensor can be connected with			
	A	digital input card	B	digital output card
	C	analog input card	D	analog output card
50	Fe3C is known			
	A	Cementite	B	Ferrite
	C	Austenite	D	Carbide

51	The hot working of metals is carried out			
	A	At the recrystallisation temperature	B	The any temperature
	C	Below the recrystallisation temperature	D	Above the recrystallisation temperature
52	Which of the following is not a gating system?			
	A	Core	B	Sprue
	C	Runner	D	Riser
53	A casting defect which results in general enlargement of casting is known as			
	A	shift	B	sand wash
	C	swell	D	scab
54	In thread cutting operation the saddle is moved by			
	A	head stoke	B	tail stoke
	C	tool post	D	lead screw
55	In shaper the ram should move			
	A	slower during return stroke	B	faster during return stroke
	C	at the same speed during return stroke	D	All of above
56	Which of the following operation cannot be performed by the drilling machine?			
	A	Drilling	B	Reaming
	C	Boring	D	Slotting
57	Which welding is usually used to join the ends of two pipes of uniform cross section?			
	A	Upset welding	B	Flash welding
	C	Spot	D	Projection
58	During the welding the current intensity depends upon			
	A	thickness of plate	B	method of edge preparation
	C	electrode diameter	D	nature of metal
59	Which one of the following is a machine used to perform extrusion?			
	A	Forge hammer	B	Milling machine
	C	Rolling mill	D	Press
60	Theoretically, the maximum reduction possible in a wire drawing operation, under the assumptions of a perfectly plastic metal, no friction, and no redundant work, is which of the following?			
	A	zero	B	0.63

	C	1.0	D	2.72
61	In graphical solution of solving Linear Programming problem to convert inequalities into equations, we			
	A	use Slack variables	B	use Surplus variables
	C	use Artificial surplus variables	D	simply assume them to be equations
62	When we solve maximization problem by simplex method the elements of net evaluation row of optimal solution must be (when we use opportunity cost concept)			
	A	either zeros or positive numbers	B	either zeros or negative numbers
	C	all are negative numbers	D	all are zeros
63	The total number of allocation in a basic feasible solution of transportation problem of $m \times n$ size is equal to			
	A	$m \times n$	B	$(m / n) - 1$
	C	$m + n + 1$	D	$m + n - 1$
64	To convert the assignment problem into a maximization problem			
	A	deduct smallest element in the matrix from all other elements	B	all elements of the matrix are deducted from the highest element in the matrix
	C	deduct smallest element in any row from all other elements of the row	D	deduct all elements of the row from highest element in that row
65	In general, sequencing problem will be solved by using .....			
	A	Hungarian Method	B	Simplex method
	C	Johnson and Bellman method	D	Flood's technique
66	The lead-time is the time:			
	A	between placing the order and receiving the materials	B	to place orders for materials
	C	of receiving materials	D	between receipt of material and using materials
67	Replacement of an item will become necessary when			
	A	old item becomes too expensive to operate or maintain	B	when your operator desires to work on a new machine
	C	when your opponent changes his machine in his unit	D	when company has surplus funds to spend
68	Hooke's law holds good upto			
	A	proportional limit	B	yield point
	C	elastic limit	D	plastic limit

69	<p>The stress and strain curves for four different materials, <i>i.e.</i>, mild steel, cast iron, brass and cast aluminum are shown in the following figure. The curve A is for</p> 			
	A	mild steel	B	cast iron
	C	brass	D	cast aluminum
70	<p>A solid shaft of diameter <math>D</math> transmits the torque equal to where <math>\tau</math> = Maximum allowable shear stress.</p>			
	A	$T = \frac{\pi}{32} \tau D^3$	B	$T = \frac{\pi}{8} \tau D^3$
	C	$T = \frac{\pi}{16} \tau D^3$	D	$T = \frac{\pi}{64} \tau D^3$
71	<p>The relation between maximum stress (<math>\sigma</math>) offered by a section, bending moment (<math>M</math>) and section modulus (<math>Z</math>) is given by</p>			
	A	$M = \sigma / Z$	B	$M = Z / \sigma$
	C	$M = \sigma \times Z$	D	$M = 1/(\sigma \times Z)$
72	<p>In simple bending of beam the stress in the beam</p>			
	A	is constant	B	varies linearly
	C	varies exponentially	D	varies parabolically
73	<p>In a thin cylinder ratio of hoop stress to longitudinal stress is</p>			
	A	2	B	4
	C	1/2	D	1/4
74	<p>Maximum normal stress theory is used for</p>			
	A	ductile material	B	brittle material
	C	both materials	D	fatigue failure

75	Statement 1: A histogram gives the frequency of occurrence of the gray level. Statement 2: A histogram is invariant to rotation.			
	A	Statements 1 and 2 are wrong	B	Statement 1 is correct and Statement 2 is wrong
	C	Statements 1 and 2 are correct	D	Statement 2 is correct and Statement 1 is wrong
76	For an eight-bit image $x[m, n]$ , the transformation $y[m, n] = 255 - x[m, n]$ will yield a/an			
	A	dark image	B	bright image
	C	negative of the input image	D	output image same as the input image
77	Which of the following filters will in general have the best performance in enhancing edges in an image?			
	A	Mean filter	B	Mode filter
	C	Median filter	D	Laplace filter
78	Which of the following statement is not correct?			
	A	A robot may not injure a human being or through inaction, allow a human being to come to harm	B	A robot must obey orders given to it by human beings, except where such orders would conflict with law A
	C	A robot must protect its own existence as long as such protection does not conflict laws A & B.	D	A robot is a programmable, single function manipulator designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks
79	Which of the following is most common robot configuration?			
	A	Revolute or articulated	B	Cartesian
	C	Cylindrical	D	Spherical
80	In a CAD package, mirror image of a 2D point P (5, 10) is to be obtained about a line which passes through the origin and makes an angle of $45^\circ$ counterclockwise with the X-axis. The coordinates of the transformed point will be			
	A	(7.5, 5)	B	(10, 5)
	C	(7.5, -5)	D	(10, -5)
81	If C is the circle $ z - 2  = 3$ then $\int_C \frac{2z}{(z-2)^2} dz$ equals			
	A	0	B	$2\pi i$

	C	$8\pi i$	D	$4\pi i$
82	At $z = 0$ , the function $\frac{1}{z(z-2)}$ has			
	A	A simple pole	B	A pole of order 2
	C	A pole of order 3	D	Essential singularity
83	Let $A = [a_{ij}]_{3 \times 3}$ and $A^3 = [b_{ij}]_{3 \times 3}$ . If the characteristic equation of A is $\lambda^3 - \lambda - 2 = 0$ then			
	A	$a_{ij} = b_{ij}$ for all i and j	B	$a_{ij} = b_{ij}$ if and only if $i \neq j$
	C	For every i and j, $a_{ij} \neq b_{ij}$	D	$a_{ij} = b_{ij}$ if and only if $i = j$
84	If A is a square matrix all whose eigen values are real and such that $A^3$ is zero matrix, then which of the following statements is true?			
	A	All the eigen values of A are zero	B	$\det A = 0$
	C	Both (A) and (B)	D	Neither (A) nor (B)
85	Consider the system of linear equations $Ax = b$ where $A = \begin{bmatrix} 1 & 2 & 4 \\ 3 & 6 & 12 \end{bmatrix}$ and $b = \begin{bmatrix} 3 \\ 9 \end{bmatrix}$ . Then the system has			
	A	No solution	B	Unique solution
	C	More than one but finite number of solutions	D	Infinite solutions
86	The mean of the binomial distribution in which number of trials is $n$ and the probability of success is $p$ is given by			
	A	$p(1 - p)$	B	$np$
	C	$n(1 - p)$	D	$np(1 - p)$
87	Which of the following would be used for solving an algebraic equation?			
	A	Trapezoidal rule	B	Simpson's 1/3 rule
	C	Gauss elimination method	D	Bisection method
88	Which of the following represents Newton-Raphson's formula for solving an algebraic equation $f(x) = 0$ ?			
	A	$x_{n+1} = x_n + \frac{f(x_n)}{f'(x_n)}$	B	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$
	C	$x_{n+1} = x_n + \frac{f'(x_n)}{f(x_n)}$	D	$x_{n+1} = x_n - \frac{f'(x_n)}{f(x_n)}$

89	Which of the following is true for the one dimensional heat equation?			
	A	It is second order linear equation	B	It is first order linear equation
	C	It is second order non-linear equation	D	It is first order non-linear equation
90	The inverse Laplace transform of $F(s) = \frac{1}{s^2+2s}$ is			
	A	$e^{-t} \sin ht$	B	$e^{-t} \cos ht$
	C	$e^{-t} \sin t$	D	$e^{-t} \cos t$
91	The Laplace transform of $f(t) = \frac{\sin ht}{t}$ is			
	A	$2 \left( \log \left( \frac{s+1}{s-1} \right) \right)$	B	$2 \left( \log \left( \frac{s-1}{s+1} \right) \right)$
	C	$\frac{1}{2} \left( \log \left( \frac{s-1}{s+1} \right) \right)$	D	$\frac{1}{2} \left( \log \left( \frac{s+1}{s-1} \right) \right)$
92	If $\alpha$ and $\beta$ are respectively the order and degree of the differential equation $\frac{d^2y}{dx^2} - 2x = \left( \frac{dy}{dx} \right)^3$ then			
	A	$(\alpha, \beta) = (2,1)$	B	$(\alpha, \beta) = (2,3)$
	C	$(\alpha, \beta) = (1,2)$	D	$(\alpha, \beta) = (3,2)$
93	Which of the following equations is an exact equation?			
	A	$(1-3x)dy + (2x-3y)dx = 0$	B	$(2x-3y)dy + (1-3x)dx = 0$
	C	$(2x+3y)dy = (1+3x)dx$	D	None of these
94	The general solution of the differential equation $(y - px)(p - 1) = p$ (where $p = \frac{dy}{dx}$ ), represents			
	A	A family of circles	B	A family of ellipses
	C	A family of straight lines	D	None of these
95	If $z = x^3y + 4xy^3$ ; $x = \sin t$ and $y = \cos t$ , then the value of $\frac{dz}{dt}$ at $t = 0$ is			
	A	4	B	-4
	C	8	D	-8
96	If $f(x, y) = x^3 + y^3 - 63x - 63y + 12xy$ then (3,3) is			
	A	A point of maxima	B	A point of minima

	C	A saddle point	D	None of these
97	The equation of the normal line to the surface $x^2yz + 3y^2 = 2xz^2 - 8z$ at $(1, 2, -1)$ is			
	A	$\frac{x-1}{-6} = \frac{y-2}{11} = \frac{z+1}{-14}$	B	$\frac{x-1}{-6} = \frac{y-2}{-11} = \frac{z+1}{-14}$
	C	$\frac{x-1}{-6} = \frac{y-2}{11} = \frac{z+1}{14}$	D	$\frac{x-1}{6} = \frac{y-2}{11} = \frac{z+1}{14}$
98	$f(x) =  e^{x-1} $ is			
	A	Differentiable everywhere on the real line	B	Differentiable everywhere except $x = 0$
	C	Differentiable everywhere except $x = 1$	D	Differentiable everywhere except $x = 0, 1$
99	The value of the improper integral $\int_0^\infty \frac{dx}{1+x^2}$ is			
	A	$\frac{\pi}{4}$	B	$\frac{\pi}{2}$
	C	$\pi$	D	0
100	If $\vec{F} = (3x + 2y + 4z)\hat{i} + (2x + by + 4z)\hat{j} + (4x + 4y - 8z)\hat{k}$ , is solenoidal then the value of $b$ is			
	A	5	B	-5
	C	10	D	-10