## DCCET 2019

	PUCE	. 1 - 2	010		
			Seat No		
S	UB: MECHANICAL ENGINEERING (ME)				
			Time:1 Hour 30 minutes		
li	nstructions:				
	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 cal	culato	or is allowed		
1.	In order to determine the effects of a force, acting on a body, we must know				
	A Magnitude of the force	В	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	В	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 <sup>2</sup>	В	kg-m-s <sup>2</sup>		
	$C   kg/m^2$	D	$m^4$		
4.	Moment of inertia of a circular section about its diameter(d) is				
	A $d^3/16$	В	$d^{3}/32$		
	$C = d^4/32$	D	$d^4/64$		
5.	The ratio of static friction to dynamic fricti	on is			
	A equal to one	В	less than one		
	C greater than one	D	none of these		
6.	The bodies which rebound after impact are called				
	A inelastic bodies	В	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	В	modulus of elasticity		
	C bulk modulus	D	poisson¢s ratio		
8.			± ·		
0.	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	В	bolt and tube are under compression		
	C bolt is under compression and tube	D	bolt and tube are under compression bolt is under tension and tube is under		
	is under tension	ט			
9.		11v n	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				
	1 0				
	A Young modulus	В	modulus of rigidity		
10	C bulk modulus	D . aina1	Poissonøs ratio		
10.	The extremeties of any diameter on Mohrø		=		
	A principal stresses	В	normal stresses on plane at 45°		

D The capacity of a strained body for doing work on removal of the straining force, is called

В

D

resilience

impact energy

shear stresses on plane at 45°

strain energy

proof resilience

A

C

normal and shear stresses on a plane

12.	when there is a sudden increase or decrease in shear force diagram between any two points, it				
		eates that there is a			
		Point load at the two points	В	no loading between the two points	
	C	uniformly distributed load between	D	uniformly varying load between the two	
		the two points		points	
13.	A sp	ring is used to absorb shocks and vibrat	tions	is	
	A	conical spring	В	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	В	stronger in tension	
	C	free from stresses	D	leak-proof	
15.	The 1	buckling load for a given column deper	ids up	oon	
	A	area of cross-section of the column	В	length and least radius of gyration of the column	
	C	modulus of elasticity for the	D	all of the above	
		material of the column			
16.	The	columns whose slenderness ratio is less	than	80, are known as	
	A	short columns	В	long columns	
	C	weak columns	D	medium columns	
17.				the movement of one layer of liquid over	
	another adjacent layer of liquid, is called				
	A	surface tension	В	compressibility	
		capillarity	D	viscosity	
18.		pressure measured with the help of the		· · · · · · · · · · · · · · · · · · ·	
	-	atmospheric pressure	В	gauge pressure	
		absolute pressure	D	mean pressure	
19.	The centre of gravity of the volume of the liquid displaced is called				
		centre of pressure	В	centre of buoyancy	
		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				
		steady flow	В	uniform flow	
		•		turbulent flow	
21.				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				
		continuity equation	В	Bernoulliøs equation	
		Pascaløs law	D	Archimedeø principle	
22.		tot tube is used to measure the	D	The inneces principle	
<i></i> .		velocity of the flow at the required	В	pressure difference between two points in a	
		point in pipe	D	pipe	
		total pressure of liquid flowing in a	D	discharge through a pipe	
	C	pipe	ט	discharge through a pipe	
23.	A nii	1 1	otor c	of orifice fitted externally or internally to the	
<i>43</i> .	A pipe of length more than double the diameter of orifice fitted externally or internally to the orifice is called a				
		notch	В	weir	
		mouthpiece	D	Nozzle	
		moumpiece	ע	TIOLLIC	

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24.	The hydraulic mean depth or the hydrau	ilic radius	s is the ratio of			
	A area of flow and wetted perimeter	В	wetted perimeter and diameter of pipe			
	C velocity of flow and area of flow	D	none of these			
25.	The magnitude of water hammer depend	ds upon tl				
	A elastic properties of the pipe material	В	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	В	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	3			
	A less than unity	В	unity			
	C between 1 and 6	D	more than 6			
28.	The ratio of the inertia force to the visco	ous force	is called			
	A Reynoldøs number	В	Froudeøs number			
	C weberø number	D	Eulerøs number			
29.	An impulse turbine is used for		,			
	A low head of water	В	high head of water			
	C medium head of water	D	high discharge			
30.			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	В	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	В	Kalpan turbine			
	C Francis turbine	D	none of these			
32.			only when the pressure rise in the impeller is			
J <b>_</b> .	equal to the	5 iiquia c	my when the pressure rise in the imperior is			
	A kinetic head	В	velocity head			
	C manometric head	D	static head			
33.	First law of thermodynamics deals with		Static field			
55.	A conservation of heat	В	conservation of momentum			
	C conservation of mass	D	conservation of momentum			
34.			<del></del>			
J-T.	The behavior of a perfect gas, undergoing any change in the variables which control physical properties, is governed by					
	A Boyle¢s law	В	Charlesølaw			
	C Gay-Lussac law	D	all of these			
35.	The absolute zero pressure will be	D	an of these			
33.	A when molecular momentum of the	D	at sea level			
	system becomes zero					
	C at the temperature of -273K	D	at the centre of the earth			
36.			of pressure and volume (p.v) is known as			
	A workdone	В	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 ca	ılled				
	A isothermal process	В	hyperbolic process			
	C adiabatic process	D	polytropic process			
38.	The compression ratio for diesel engine is					
	A 3 to 6	В	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	В	constant temperature			
	C constant pressure	D	none of these			
40.	Which of following has the highest calorific value?					
	A Peat	В	Lignite			
	C Bituminous coal	D	Anthracite coal			
41.	Water tube boilers are					
	A internally fired	В	externally fired			
	C internally as well as externally fired	D	none of these			
42.	The forced circulation of water does not tak	e pla	ce in			
	A La-Mont boiler	В	Lancashire boiler			
	C Velox boiler	D	Benson boiler			
43.	A safety valve usually employed with statio	nary	boilers is			
	A lever safety valve	В	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	В	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		less than velocity of sound			
	C more than the velocity of sound	D				
46.	The difference of supersaturated temperature and saturation temperature at that pressure is					
	called	-				
	A degree of supersaturation					
	C degree of undercooling	D	none of these			
47.	1 ' 1					
	A isothermal process	В	isentropic process			
4.0	C throttling process	D	free-expansion process			
48.	Multi-stage steam turbines are of the	ъ	.•			
	A velocity compounded type	В	reaction type			
40	C pressure compounded type D all of these					
49.	The compression ignition engines are governed by					
	A hit and miss governing	В	qualitative governing			
<b>7</b> 0	C quantitative governing	D	combination of (B) and (C)			
50.	The knocking in spark ignition engines can		•			
	A retarding the spark	В	increasing the engine speed			
<b>~</b> 1	C both (A) and (B)	D	none of these			
51.	The octane number of petrol, generally available, is					
	A 20 to 40	В	40 to 60			
	C 40 to 60	D	80 to 100			

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52.	A large clearance volume in a reciprocat	ing comp	pressor results in		
	A reduced volume flow rate	В	increased volume flow rate		
	C lower suction pressure	D	lower delivery pressure		
53.	The stagnation pressure rise in a centrifu	gal comp	pressor takes place		
	A in the diffuser only	В			
	C in the diffuser and impeller	D	in the inlet guide vanes only		
54.	<u> </u>	combust	ion after passing through the gas turbine are		
	discharged into				
	A atmosphere	В	vacuum		
	C discharge nozzle	D	back to the compressor		
55.		cold bod	y is directly proportional to the surface area		
	and difference of temperature between the two bodies. This statement is called				
	A First law of thermodynamics	В	Newtonøs law of cooling		
	C Newtonøs law of heating	D			
56.	The critical radius is the insulation radius	s at whic			
	A maximum	В	minimum		
	C zero	D	none of these		
57.	The automobile radiator is a heat exchan				
	A parallel flow type	В	counter flow type		
	C cross flow type	D	regenerator type		
58.	Fouling factor is used				
	A in heat exchanger design as safety	В	in case of Newtonian fluids		
	factor	_			
	C when liquid exchanges heat with a	D	none of the above		
	gas		none of the doore		
59.	_	e to the i	nternal conduction resistance is known as		
57.	A Grashoff number	B	Biot number		
	C Stanton number	D	Prandtl number		
60.					
00.	The ratio of Nusselt number and the product of Reynoldøs number and prandtl number is equal to				
	A Stanton number	В	Biot number		
	C Peclet number	D	Grashoff number		
61	A boot-strap cooling system has	D	Grasion namoor		
01.	A one heat exchanger	В	two heat exchangers.		
	C three heat exchangers	D	four heat exchangers		
62.	$\mathcal{E}$		<u> </u>		
02.	The ratio of the maximum displacement of the forced vibration to the deflection due to the static force, is known as				
	A damping factor	В	damping coefficient		
	C logarithmic decrement	D	magnification factor		
63.	The factor which affects the critical spee				
03.	A diameter of disc	B	span of shaft		
	C eccentricity	D	all of these		
64.	A Hartnell governor is a	D	an of these		
04.		D	nondulum tymo governor		
	A dead weight governor C spring loaded governor	B D	pendulum type governor		
65.	C spring loaded governor The radial distance of a tooth from the pi		inertia governor		
υ.	A dedendum	В	addendum		
	C clearance	D D	working depth		
	C CICALATICE	ע	WOLKING ACDIN		

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66.	Which of the following is an antifriction bea	aring	?
	A journal bearing	В	pedestal bearing
	C collar bearing	D	needle bearing
67.	A key made from a cylindrical disc having s	segme	ental cross-section, is known as
	A feather key	В	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	В	0.5 to 1
	C 1 to 1.7	D	1.7 to 4.5
69.	Micro-structure of material is, generally, exa	amine	ed by
	A naked eye	В	optical microscope
	C X-ray technique	D	none of these
70.	Which of the following welding process use	s non	-consumable electrodes?
	A TIG welding	В	MIG welding
	C Manual arc welding	D	Submerged arc welding
71.	In arc welding, the temperature of heat prod	uced	
	A 3000°C to 4000°C	В	4000°C to 5000°C
	C 5000°C to 6000°C	D	6000°C to 7000°C
72.	The operation of cutting a cylindrical hole in	n a sh	· · · · · · · · · · · · · · · · · · ·
	A shearing	В	piercing
	C punching	D	blanking
73.	Dielectric is used in		
	A electro-chemical machining	В	ultra-sonic machining
	C electro-discharge machining	D	laser machining
74.	A drill considered as a cutting tool having ze		
	A flat drill	В	straight fluted drill
	C parallel shank twist drill	D	tapered shank twist drill
75.	Lathe bed is made of	_	
	A mild steel	В	alloy steel
-	C pig iron	D	chilled cast iron
76.	CPM stands for	ъ	
	A Combined Process Method	В	Critical Path Method
77	C Common Planning Method	D	Critical Process Method
77.	Quenching theory is used for	D	
	A job-shop scheduling	В	inventory problems
70	C traffic congestion studies	D	all of these
78.	The starter motor is driven by A chain drive	D	and duive
	A chain drive C flat belt drive	B D	gear drive V-belt drive
79.	The condition that results in large quantities		
19.	A insufficient air during combustion	B	insufficient fuel during combustion
	C low temperature combustion	D	high temperature combustion
80.	1		the engine cylinder by fresh charge coming
ου.	into the engine cylinder from the crank-case		
	A cleaning	B B	priming
	C scavenging	D	Detonation Detonation
	C beavenging	ע	Determition

81. Let 
$$f(x) = |x|, -2 \le x \le 2$$
; 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  $y = (c_1 + c_2 x)e^{\sqrt{2}x} + (c_3 + c_4 x)e^{-\sqrt{2}x}$ 

 $y = c_1 e^{\sqrt{2}x} + c_2 e^{\sqrt{2}x} + c_3 e^{-\sqrt{2}x} + c_4 e^{-\sqrt{2}x}$ 

C  $y = c_1 e^{\sqrt{2}x} + c_2 e^{-\sqrt{2}x}$ 

D  $y = (c_1 + c_2 x + c_3 x^2 + c_4 x^3)e^{\sqrt{2}x}$ 

83. The value of the integral 
$$\oint_C \frac{\cos z}{z - \pi} dz$$
,  $C: |z - 1| = 3$  is

A  $\pi i$ 

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 
$$\frac{dy}{dx} = x + y, \ y(0) = 1, \ h = 0.1 \text{ is}$$

A 1.2

B 1.36

C 1.1

D 1.22

A  $|A \cdot B| = |A| \cdot |B|$ 

 $\mathbf{B} \qquad \left(A \bullet B\right)^{-1} = A^{-1} \bullet B^{-1}$ 

C |A + B| = |A| + |B|

- $D \qquad \left(A+B\right)^T \neq A^T + B^T$
- 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 Simpsonøs 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 
$$\frac{dy}{dx} + \frac{x}{1+x}y = 1 + x$$
 is

A 
$$e^{3}$$

B 
$$e^{x}(1+x)$$

C 
$$\frac{e^x}{1+x}$$

D 
$$e^{x+x^2/2}$$

89. A necessary and sufficient condition that line integral 
$$\oint_C \vec{A} \cdot \vec{dr} = 0$$
 for every closed curve *C* is

that

A 
$$div \vec{A} = 0$$

B 
$$curl \vec{A} = 0$$

C 
$$\overrightarrow{div A} \neq 0$$

D 
$$curl \vec{A} \neq 0$$

90. If 
$$u = x^3 e^{-\frac{x}{y}}$$
 then  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$  is

A 
$$3u$$

91. The value of 
$$\int_C (y^2 dx + x^2 dy)$$
 where C is the boundary of the square  $-1 \le x \le 1$ ,  $-1 \le y \le 1$ 

$$C 2(x+y)$$

92. The function 
$$2x - x^2 + py^2$$
 is harmonic if p equals to

93. The pair of linear equations 
$$kx + 3y + 1 = 0$$
,  $2x + y + 3 = 0$  has exactly one solution if

A 
$$k = 6$$

B 
$$k$$
 has any value

C 
$$k \neq 6$$

94. Minimum value of 
$$x^2 + y^2 + 6x + 14$$
 is

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

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

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

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

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 
$$\sqrt{\pi}$$

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

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

$$A \qquad y = c_1 + c_2 \log x$$

$$B y = c_1 \log x$$

$$C y = c_1 + c_2 x$$

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

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

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

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

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

A 
$$e^{-at} - e^{-bt}$$

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

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

D 
$$e^{bt} - e^{at}$$

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100.

A  $3\times3$  matrix has eigen values 1, 0, 2. Which is TRUE of the following? A Trace of A = 0 B  $A^{-1}$  does not exist

A is not diagonalizable  $\mathbf{C}$ 

None of these D

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