

Seat No. _____

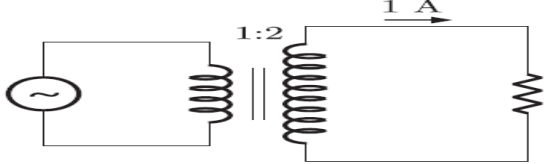
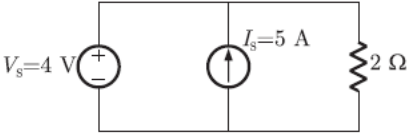
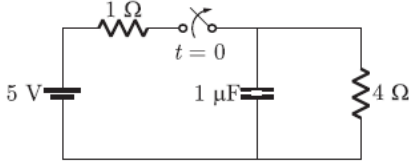
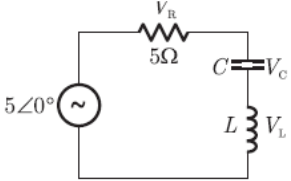
SUB: _ELECTRICAL ENGINEERING (EE)

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.	Cogging of induction motor occurs when			
	A	Number of stator teeth – number of rotor teeth = odd number	B	Number of stator teeth – number of rotor teeth = even number
	C	Number of stator teeth – number of rotor teeth = 0	D	Number of stator teeth – number of rotor teeth = negative number
2.	Distributed winding and short chording employed in AC machines will result in			
	A	Increase in emf and reduction in harmonics	B	Reduction in emf and increase in harmonics
	C	Increase in both emf and harmonics	D	Reduction in both emf and harmonics
3.	An induction motor having full load torque of 60 N-m, when delta connected develops a starting torque of 120 N-m. For the same supply voltage, if the motor is changed to star connection, the starting torque developed will be			
	A	40 N-m	B	60 N-m
	C	90 N-m	D	120 N-m
4.	A 40 kVA transformer has a core loss of 400W and a full load copper loss of 800W. The load at which maximum efficiency occurs is			
	A	20 kVA	B	24.92 kVA
	C	28.28 kVA	D	34.64 kVA
5.	A synchronous motor is operating on no-load at upf. If the field current is increased, pf will become			
	A	Leading and current will increase	B	Lagging and current will decrease
	C	Lagging and current will increase	D	Leading and current will decrease
6.	A synchronous generator is feeding a zero power factor (lagging) load at rated current. The armature reaction is			
	A	magnetizing	B	demagnetizing

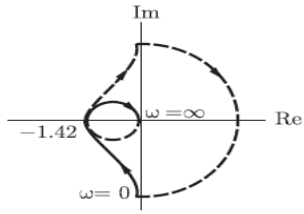
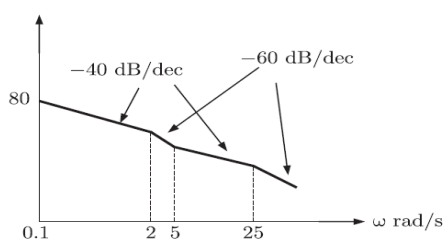
	C	cross-magnetizing	D	ineffective
7.	Which type of test is generally performed to estimate the efficiency of d.c. series machines ?			
	A	Hopkinson test	B	Swinburne test
	C	Retardation or running down test	D	Field test
8.	A single phase transformer has turns ratio 1:2 and is connected to a purely resistive load as shown in figure. The magnetizing current drawn is 1A and the secondary current is 1A. If core losses and leakage reactances are neglected, the primary current is			
				
	A	1.41 A	B	2 A
	C	2.24 A	D	3 A
9.	Speeds above normal in a d.c. shunt motor can be obtained by			
	A	Decreasing the field current	B	Increasing the field current
	C	Decreasing the armature current	D	Increasing the armature current
10.	Slip test in a synchronous machine is performed to determine			
	A	slip	B	direct axis reactance and quadrature axis reactance
	C	positive sequence reactance and negative sequence reactance	D	sub-transient reactance
11.	For the circuit shown, find the current flowing in 2Ω resistor			
				
	A	5 A	B	2 A
	C	7A	D	Zero
12.	The switch in the circuit has been closed for a long time. It is opened at time $t = 0$. At time $t = 0^+$, the current flowing through the capacitor is			
				
	A	Zero	B	1 A
	C	1.25 A	D	5 A
13.	In the circuit shown, the magnitudes of V_L and V_C are twice that of V_R . Given that $f = 50$ Hz, the inductance of the coil is			
				
	A	2.14 mH	B	5.30 mH

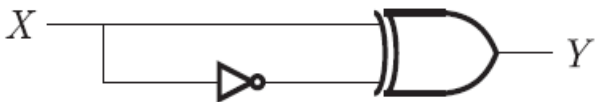
	C	31.8 mH	D	1.32 mH
14.	The voltage and current in an AC circuit are 230/0° and 10/20° respectively. The circuit will be -----			
	A	capacitive	B	inductive
	C	resistive	D	in resonance
15.	In a power measurement by two wattmeter method in 3-phase AC circuit, if one wattmeter measures the total power and the other wattmeter indicates zero reading, then power factor of the circuit is			
	A	0.5	B	Zero
	C	Unity	D	0.866
16.	The energy stored in a 10 μF capacitor when a terminal voltage of 600V is applied would be			
	A	3.6 J	B	3.2 J
	C	2.4 J	D	1.8 J
17.	If H and J denote magnetic field intensity and current density respectively, which one of the following is true for steady magnetic field?			
	A	$\nabla \times H = J$	B	$\nabla \times J = H$
	C	$\nabla \cdot H = J$	D	$\nabla \cdot J = H$
18.	Two infinite parallel conductors carrying currents of 100A each and separated by distance of 20 cms would experience a force of			
	A	0.02 N/m	C	0.04 N/m
	C	0.01 N/m	D	0.03 N/m
19.	Two inductors having inductance L_1 and L_2 are connected in parallel. The mutual inductance between them is M. If the mutual fields oppose each other, then equivalent inductance is given by			
	A	$L_1 + L_2 - 2M$	B	$L_1 + L_2 + 2M$
	C	$L_1 L_2 - M^2 / (L_1 + L_2 + 2M)$	D	$L_1 L_2 - M^2 / (L_1 + L_2 - 2M)$
20.	A source is having an impedance of $2 + j3$ ohms. For maximum power transfer, the load impedance should be			
	A	2 ohms	B	3 ohms
	C	$2 + j3$ ohms	D	$2 - j3$ ohms
21.	A 4-pole dc generator is running at 1500 rpm. The frequency of current in the armature winding is			
	A	25 Hz	B	50 Hz
	C	100 Hz	D	Zero
22.	A d.c. shunt motor is started at no load and its rated speed is noted as 1000 rpm. After 5 hours of continuous no load running, its speed would			
	A	become more than 1000 rpm	B	become less than 1000 rpm
	C	remain 1000 rpm	D	may become less or more than 1000 rpm
23.	The stator mmf wave in a 3-Φ, 4-pole, 50 Hz Induction Motor is found to have fundamental, 5 th and 7 th harmonic waves. The rotating fields due to these harmonics rotate respectively at			
	A	1500 rpm, 300 rpm, 214.3 rpm	B	1500 rpm, 300 rpm, -214.3 rpm
	C	1500 rpm, -300 rpm, -214.3 rpm	D	1500 rpm, -300 rpm, 214.3 rpm
24.	A 1-phase motor which does not have any winding on its rotor is			
	A	Shaded-pole motor	B	Hysteresis motor
	C	Reluctance motor	D	Repulsion motor
25.	Two 100 kVA single-phase transformers are connected in open delta. The maximum balanced 3-phase load that the combination can deliver without overloading either unit is			
	A	173.2 kVA	B	200 kVA

	C	86.6 kVA	D	115.5 kVA
26.	Stringing chart is useful			
	A	for finding sag in the conductor	B	in the design of tower
	C	in the design of insulator string	D	finding the distance between the towers
27.	The inductance of a transmission line is minimum when			
	A	GMD is high	B	GMD is high and GMR is low
	C	Both GMD and GMR are high	D	GMD is low and GMR is high
28.	The values of ABCD constants for a short transmission line are respectively			
	A	Z, 0, 1 and 1	B	0, 1, 1 and Z
	C	1, Z, 0 and 1	D	1, 1, Z and 0
29.	For a good voltage profile under no-load condition, a long line needs			
	A	Shunt capacitors at receiving end	B	Shunt reactors at receiving end
	C	Shunt resistance at receiving end	D	Shunt capacitors at mid-point and at the receiving end of the line
30.	Bulk power transmission over long HVDC lines is preferred due to			
	A	Low cost of HVDC terminals	B	No harmonic problems
	C	Minimum line power losses	D	Simple protection
31.	A generating unit has an incremental production cost of Rs. 60 per MWh. If the penalty factor for this unit is 1.2, the incremental cost of power delivered is			
	A	Rs. 50 per MWh	B	Rs. 72 per MWh
	C	Rs. 61.2 per MWh	D	Rs. 58.8 per MWh
32.	The co-efficient of reflection of a short circuited line for voltage is			
	A	-1	B	1
	C	0	D	Infinity
33.	Corona loss in a transmission line increases with			
	A	increase in supply frequency and conductor size	B	increase in supply frequency but reduction in conductor size
	C	decrease in supply frequency and conductor size	D	decrease in supply frequency but increase in conductor size
34.	A hydraulic turbine having rated speed of 250 rpm is connected to a synchronous generator. In order to produce power at 50 Hz, the number of poles required in the generator are			
	A	6	B	12
	C	16	D	24
35.	The impedance value of a generator is 0.2 pu on a base value of 11 kV, 50 MVA. The impedance value for a base value of 22 kV, 150 MVA is			
	A	0.15 pu	B	0.2 pu
	C	0.3 pu	D	2.4 pu
36.	If the inductance and capacitance of the power system are respectively 1H and 0.01 μ F and the instantaneous value of current interrupted is 10A, the voltage across the circuit breaker contacts would be			

	A	50 kV	B	57 kV
	C	60 kV	D	100 kV
37.	Buchholz relay is used for protection of			
	A	Induction motors	B	Synchronous machines
	C	Transformers	D	Transmission lines
38.	If the fault current is 2000A, the relay setting is 50% and CT ratio is 400/5, the plug setting multiplier will be			
	A	25	B	15
	C	50	D	10
39.	For a fully transposed line			
	A	Positive, negative and zero sequence impedance are equal	B	Positive and negative sequence impedance are equal
	C	Zero and positive sequence impedance are equal	D	Zero and negative sequence impedance are equal
40.	Which of the following statements are incorrect about Corona ? 1. Corona loss is absent in HVDC lines 2. Corona loss increases with increase in conductor diameter. 3. Visual critical voltage is less than disruptive critical voltage 4. Corona phenomena is accompanied with production of ozone gas Out of these			
	A	2 and 3 are incorrect	B	1 and 2 are incorrect
	C	1,2 and 3 are incorrect	D	3 and 4 are incorrect
41.	Diversity factor is			
	A	Sum of maximum demands of consumers/system maximum demand	B	Maximum demand of consumers/average demand
	C	Demand of all consumers/average demand	D	Average demand/maximum demand
42.	Load frequency control is achieved by properly matching the individual machine's			
	A	Reactive powers	B	Generated voltages
	C	Turbine inputs	D	Turbine and generator ratings
43.	Peterson coil is used			
	A	for grounding of neutral	B	To reduce fault current

	C	For connecting two interconnected systems	D	For shunt compensation of transmission lines
44.	In a thermal power plant, the feed water coming to the economizer is heated using			
	A	HP steam	B	LP steam
	C	Direct heat in the furnace	D	Flue gases
45.	For a 15 bus power system with 3 voltage controlled bus, the size of the Jacobian matrix is			
	A	11×11	B	12×12
	C	24×24	D	25×25
46.	A 100 MVA, 11 kV, 3-phase, 50 Hz, 8-pole synchronous generator has an inertia constant H of equal to 4 seconds. The energy stored in the rotor at synchronous speed will be			
	A	100 MJ	B	400 MJ
	C	800 MJ	D	12.5 MJ
47.	After triggering an SCR, the gate pulse is removed, the current in SCR will			
	A	remain the same	B	immediately fall to zero
	C	slightly reduce	D	initially increase and then fall to zero
48.	A single phase fully controlled bridge rectifier supplies an inductive load. If the maximum supply voltage is E_m and firing angle is α , the average output voltage assuming constant output current would be			
	A	$(E_m/2\pi)\cos\alpha$	B	$(E_m/\pi)\cos\alpha$
	C	$(E_m^2/\pi)\cos\alpha$	D	$(2E_m/\pi)\cos\alpha$
49.	For a single phase, phase controlled rectifier, with a freewheeling diode across the load			
	A	the instantaneous output voltage v_0 is always positive	B	v_0 may be positive or zero
	C	v_0 may be positive, negative or zero	D	v_0 is always negative or zero
50.	The transfer function of a system is given as $100/(s^2 + 20s + 100)$. The system is			
	A	an overdamped system	B	an underdamped system
	C	a critically damped system	D	an unstable damped

51.	The Nyquist plot for the system is shown in figure. It has no open loop poles in right half of s-plane. The system is 			
	A	unstable	B	stable
	C	limitedly stable	D	Insufficient data is given as complete information regarding open loop transfer function is required to determine stability
52.	A type-1 system having gain K, when subjected to acceleration input signal will give a steady state error of			
	A	1	B	K
	C	1/K	D	∞
53.	The location of the closed-loop conjugate pair of poles on jω axis indicates that the system is			
	A	stable	B	unstable
	C	marginally stable	D	critically stable
54.	Routh's criteria in root locus is used to			
	A	find breakaway points	B	determine angle of asymptotes
	C	angle of departure from complex pole	D	intersection of root locus with imaginary axis
55.	The magnitude plot of a certain system is shown in figure. The system is of 			
	A	Type-1	B	Type-2
	C	Type-3	D	Type-0

56.	Laplace transform of the output response of a linear system is the system transfer function itself when the input is		
	A	a step signal	B a ramp signal
	C	an impulse signal	D a sinusoidal signal
57.	If the dominant complex poles of a higher order control system are nearer to the imaginary axis in s-plane then the nature of time response will be		
	A	oscillatory type	B non-oscillatory type
	C	sustained oscillation type	D steady type
58.	The output of the logic circuit given below is 		
	A	1	B 0
	C	X	D X'
59.	The depletion region or space charge region or transition region in a semi-conductor P-N junction diode has		
	A	electrons and holes	B positive ions and electrons
	C	positive ions and negative ions	D no ions, electrons or holes
60.	Which of the following diodes is used for voltage stabilization?		
	A	Step recovery diode	B Zener diode
	C	Tunnel diode	D Schottky diode
61.	The type of power amplifier which exhibits cross over distortion in its output is		
	A	Class A	B Class B
	C	Class AB	D Class C
62.	A flip-flop is also known as		
	A	astable multivibrator	B monostable multivibrator
	C	bistable multivibrator	D No co-relation exists between multivibrator and flip-flop
63.	A properly biased JFET will work as		
	A	Current controlled current source	B Voltage controlled voltage source
	C	Current controlled voltage source	D Voltage controlled current source
64.	Which of the following is correct for ideal op-amp 1.Slew rate should be zero 2. CMRR should be infinite 3. Input resistance should be zero 4. Output resistance should be infinite		
	A	Statement 1 is correct	B Statement 2 is correct
	C	Statement 3 is correct	D Statement 4 is correct
65.	Which of the following will not decrease as a result of negative feedback?		
	A	Instability	B Bandwidth
	C	Overall gain	D Distortion
66.	Voltage gain in an inverting op-amp is		
	A	Ratio of feedback impedance to source impedance	B Ratio of output impedance to input impedance

	C	Ratio of input impedance to output impedance	D	Inverse ratio of current gain
67.	The decimal equivalent of the hexadecimal number $(BAD)_{16}$ is			
	A	111013	B	5929
	C	3416	D	2989
68.	The number of comparators required in a 4-bit flash type A/D convertor is			
	A	16	B	15
	C	4	D	3
69.	The total number of inputs and outputs in a full adder circuit are			
	A	5	B	4
	C	3	D	2
70.	A Lissajous pattern on an oscilloscope has 5 horizontal tangencies and 2 vertical tangencies. The frequency of horizontal input is 1000 Hz. What is the frequency of vertical input?			
	A	400 Hz	B	2500 Hz
	C	4000 Hz	D	5000 Hz
71.	A high frequency ac signal is applied to a PMMC instrument. If the rms value is 2V, the reading of the instrument will be			
	A	zero	B	2 V
	C	$2\sqrt{2}$ V	C	$4\sqrt{2}$ V
72.	A current $i = (10 + 10\sin t)$ is passed through an ideal moving iron type ammeter. Its reading will be			
	A	zero	B	10 A
	C	$\sqrt{150}$ A	D	$\sqrt{10}$ A
73.	A 100 μ A ammeter has an internal resistance of 100 Ω . For extending its range to measure 500 μ A, the shunt required is of resistance (in Ω)			
	A	20	B	22.22
	C	25	D	50
74.	Which one of the following types of instruments can be used to determine rms values of ac voltage of high magnitude (10 kV) and of any waveshape?			
	A	Moving iron type instruments	B	Dynamometer type instruments
	C	Induction instruments	D	Electrostatic instruments
75.	The primary current in a CT is dictated by			
	A	the secondary burden	B	the core of the transformer

	C	the load current	D	none of the above
76.	A dynamometer type wattmeter responds to			
	A	average value of active power	B	average value of reactive power
	C	peak value of active power	D	peak value of reactive power
77.	For an SCR, dV/dt protection is achieved through			
	A	RL in series with SCR	B	RC across SCR
	C	L in series with SCR	D	RC in series with SCR
78.	When UJT is used for triggering an SCR, the waveshape of the voltage obtained from UJT circuit is			
	A	Sine wave	B	Saw tooth wave
	C	Trapezoidal wave	D	Square wave
79.	For a 3-phase, six pulse diode rectifier, the average output voltage in terms of maximum line voltage V_m is			
	A	$3\sqrt{2} V_m / \pi$	B	$3\sqrt{3} V_m / 2\pi$
	C	$3V_m / \pi$	D	$3\sqrt{3} V_m / \pi$
80.	A step-up chopper has V_s as the source voltage and α as the duty cycle. The output voltage for this chopper is given by			
	A	$V_s(1+\alpha)$	B	$V_s/(1-\alpha)$
	C	$V_s(1-\alpha)$	D	$V_s/(1+\alpha)$
81.	Which of following is characteristic equation of a square matrix $A = \begin{bmatrix} 4 & 6 \\ 0 & 2 \end{bmatrix}$?			
	(a) $\lambda^2 - 6\lambda + 8 = 0$ (b) $\lambda^2 = 6\lambda + 2$			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
82.	System of linear equation $x + y + z = 1$, $2x + 2y + 2z = 1$ and $x - y + z = 0$ has			
	(a) no solution (b) infinitely many solutions			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
83.	If $\lambda^2 - 1 = 0$ is a characteristic equation of the matrix A, then which of following is correct?			
	(a) $A^2 = 0$ (b) Inverse of A is A			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
84.	If at $x = a$, function $y = f(x)$ has local minima then in general which of following is correct?			
	(a) $f'(a) \neq 0$ (b) $f''(a) < 0$			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these

85.	If $u(x,y) = e^{xy}$ then which of following is correct			
	(a) $u_y(x,y) = e^{xy}$		(b) $u_y(x,y) = xe^{xy}$	
	A	Only (a)	B	Only (b)
86.	C	Both (a) and (b)	D	None of these
	$\int_{-a}^a x x dx = \underline{\hspace{2cm}}$			
	A	0	B	$\frac{1}{2}$
87.	C	1	D	None of these
	$\vec{r}(t) = acost\hat{i} + b\sin t\hat{j} + ct\hat{k}$ is a parametric equation of ellipse if _____			
	A	$c = 0$ and $a = b$	B	$a = b$ and $c \neq 0$
88.	C	$a \neq b$ and $c = 0$	D	None of these
	What is the length of the curve $\vec{r}(t) = (\cos t)\hat{i} + (\sin t)\hat{j}$ from $t = 0$ to $t = 2\pi$			
	A	$\frac{\pi}{2}$	B	π
89.	C	$\frac{\pi}{4}$	D	None of these
	In rolling of two fair die, what is probability of obtain sum of outcome number is 9?			
	A	1/12	B	1/6
90.	C	1/9	D	None of these
	Generally trapezoid method in numerical analysis is use for			
	(a) solution of differential equation		(b) calculation of definite integral	
91.	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
	Which of following is Laplace Equation?			
92.	A	$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$	B	$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$
	C	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$	D	none of these
	Particular integral of $\frac{d^2 y}{dx^2} - 4y = 2$ is _____			
	A	$y_p = 0$	B	$y_p = \frac{-1}{2}$

	C	$y_p = \frac{1}{4}$	D	None of these
93.	Which of following is solution of $y'' - 5y' + 6y = 0$ (a) e^{-3x} (b) e^{-2x}			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
94.	Laplace transform of a function $f(t) = t$ is _____			
	A	1	B	$\frac{1}{s}$
	C	$\frac{1}{s^2}$	D	$\frac{2}{s^2}$
95.	Which of following is correct for Laplace Transform (a) $L(\sinh at) = \frac{a}{s^2 - a^2}$ (b) $L(\cosh at) = \frac{s}{s^2 - a^2}$			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
96.	Which of following is harmonic function (a) $u(x,y) = \sin y$ (b) $u(x,y) = e^x \cos y$			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
97.	Which of following is correct (a) Sequence $u_n = \frac{1}{n}$ is divergent (b) $\sum_{n=1}^{\infty} \frac{1}{n}$ is divergent			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
98.	$i^{2021} = \underline{\hspace{2cm}}$			
	A	1	B	-1
	C	$-i$	D	i
99.	For complex valued function $f(z) = \frac{z+i}{(z-3)(z-4)^3}$ which of following is correct (a) 4 is a singular point (b) $f(z)$ has pole of order 3 at $z = 4$			
	A	Only (a)	B	Only (b)
	C	Both (a) and (b)	D	None of these
100.	$\oint_C \frac{\sin z}{z-4} dz = \underline{\hspace{2cm}}$, where C is a circle $ z = 3$.			

	A	1	B	0
	C	$2\pi i$	D	None of these