



Kerala Public Enterprises (Selection and Recruitment) Board

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Question Booklet No: 05125

Name of Examination: Electrical Engineering

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Written examination for:

(1) 051-2025-Senior Engineer – Electrical (Executive Trainee – Electrical)-The Travancore Cochin Chemicals Limited

Instructions to Candidates:

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1. Candidate should not start writing answers until indication is given to start answering.
2. The question paper contains 100 questions. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the Bubble corresponding to the question number using Blue or Black ball point pen in the OMR Sheet.
3. Each correct answer carries 1 mark. There will be no negative mark for wrong answers or unattended questions.
4. Do not write anything else on the question paper. Space for rough work is provided at the end.
5. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the 'Basic Data' portion and that the Invigilator has affixed his/her signature in the space provided in the OMR sheet.

Total number of questions: **1** Maximum marks: **100** Time: **90 Minutes**

1	The “Lissajous pattern” on an oscilloscope is used to measure			
	(A)	Amplitude only	(B)	Phase difference
	(C)	Power factor	(D)	Resistance
2	The shunt resistance circuit component obtained by no load test of an induction motor is the representation of			
	(A)	Only core loss	(B)	Only windage and friction loss
	(C)	Only copper loss	(D)	Core loss, windage and friction loss

3	Early effect in a transistor mainly affects			
	(A)	Input impedance	(B)	Output resistance
	(C)	Base current	(D)	Emitter current
4	During the blocked-rotor test, the slip is			
	(A)	Zero	(B)	Less than 1
	(C)	Equal to 1	(D)	Negative
5	For a system to be stable, the necessary condition is that all coefficients of the characteristic equation must			
	(A)	Be negative and non-zero	(B)	Have different signs
	(C)	Be positive and non-zero	(D)	Be equal to one
6	The per-unit impedance of a transformer is			
	(A)	Higher when referred to the primary side	(B)	Higher when referred to the secondary side
	(C)	The same whether referred to the primary or secondary side	(D)	Zero if the transformer is ideal.
7	The Thevenin equivalent resistance is found by			
	(A)	Removing load and finding total resistance	(B)	Short-circuiting all sources
	(C)	Deactivating independent sources and finding resistance	(D)	Measuring load resistance
8	Basic comparator is a			
	(A)	AND gate	(B)	NAND gate
	(C)	NOR gate	(D)	XOR gate
9	Main advantage of SPWM over square-wave inverter is			
	(A)	Higher DC output	(B)	Lower switching losses
	(C)	Reduced harmonic distortion	(D)	Simple circuit
10	An op-amp has a slew rate of $0.5 \text{ V}/\mu\text{s}$. Maximum frequency for a 10 V peak sine wave is approximately			

	(A) 8 kHz	(B) 16 kHz
	(C) 80 kHz	(D) 160 kHz
11	CMRR of an op-amp is the ratio of	
	(A) Differential gain to common-mode gain	(B) Common-mode gain to differential gain
	(C) Input resistance to output resistance	(D) Output voltage to input voltage
12	Maximum torque of an induction motor occurs when	
	(A) Slip=0	(B) Slip=1
	(C) Rotor resistance=stator resistance	(D) Rotor reactance=rotor resistance
13	In regenerative braking, the direction of armature current is	
	(A) same as motoring	(B) Zero
	(C) Opposite to motoring	(D) Random
14	In the “Two-Wattmeter Method” of measuring 3-phase power, if one wattmeter reads zero, the power factor of the load is	
	(A) 1.0	(B) 0.5
	(C) 0.866	(D) 0
15	A drop in system frequency indicates	
	(A) Excess generation	(B) Excess reactive power
	(C) Load greater than generation	(D) High voltage
16	Back-to-Back HVDC stations are primarily used to	
	(A) Interconnect two asynchronous AC grids	(B) Increase the voltage of a long line
	(C) Store energy in DC batteries	(D) Reduce the cost of insulators
17	The ripple current of a Boost converter with input voltage of 12 V, output voltage of 24 V, switching frequency of 10kHz and inductance of 1mH is	
	(A) 6A	(B) 1.6A
	(C) 0.2A	(D) 0.6A

18	Which ADC is most suitable for high accuracy and noise rejection			
	(A)	Flash	(B)	Successive approximation
	(C)	Dual slope	(D)	Pipeline
19	In parallel operation of alternators, real power sharing depends on			
	(A)	Excitation	(B)	Prime mover input
	(C)	Terminal voltage	(D)	Armature resistance
20	V/f control is commonly used in			
	(A)	DC drives	(B)	Induction motor drives
	(C)	Synchronous motors only	(D)	Transformers
21	Which of the following is an “Active Transducer”?			
	(A)	Strain Gauge	(B)	LVDT
	(C)	Thermistor	(D)	Solar Cell
22	What is the primary disadvantage of using a purely Proportional (P) controller?			
	(A)	It makes the system unstable	(B)	It slows down the system significantly
	(C)	It introduces a constant steady-state error (offset)	(D)	It is too complex to tune
23	The effect of integral controller on steady state error is			
	(A)	No effect	(B)	Reduce steady state error
	(C)	Increase steady state error	(D)	Increase stability
24	If the degree of series compensation K is 0.5 (50%), what happens to the power transfer capacity?			
	(A)	It remains the same	(B)	It is halved
	(C)	It doubles	(D)	It increases by 50%
25	Why is electrical power transmitted at high voltages over long distances?			

	(A)	To increase current flow	(B)	To reduce $I^2 R$ power losses in transmission lines
	(C)	To make the system safer for domestic use	(D)	Because generators only produce high voltage
26	To obtain the signal $y(t)=x(2t-3)$ from $x(t)$, which order of operations is correct?			
	(A)	Shift right by 3, then scale (compress) by 2	(B)	Scale (compress) by 2, then shift right by 3
	(C)	Shift left by 3, then scale (expand) by 2	(D)	Scale (expand) by 2, then shift left by 3
27	Initial current in an RL circuit immediately after switch ON is			
	(A)	Maximum	(B)	Equal to steady-state current
	(C)	Zero	(D)	Infinite
28	If amplitude modulation index is reduced, the output voltage of SPWM inverter			
	(A)	Increases	(B)	Decreases
	(C)	Remains same	(D)	Becomes zero instantly
29	Power MOSFET is a			
	(A)	Current-controlled device	(B)	Voltage controlled device
	(C)	Power controlled device	(D)	Charge controlled device
30	The upper cut off frequency is mainly limited by			
	(A)	Coupling capacitors	(B)	Load resistance
	(C)	Junction and stray capacitances	(D)	Biasing resistors
31	Salient-pole machines are mostly used in			
	(A)	Thermal power plants	(B)	Nuclear power plants
	(C)	Hydro-electric power plants	(D)	Gas turbine plants
32	A DC shunt motor runs at 1000 rpm at no load. If flux decreases by 10 %, the new speed (approx.) is			
	(A)	900 rpm	(B)	1000 rpm
	(C)	1100 rpm	(D)	1110 rpm

33	In a 16-bit microprocessor like the 8086, the “Segment Registers” are primarily used for			
	(A)	Memory addressing	(B)	Arithmetic operations
	(C)	Storing intermediate results	(D)	Handling interrupts
34	A circuit has a series combination of an inductor, capacitor and resistor, the number of state variables are			
	(A)	3	(B)	2
	(C)	1	(D)	0
35	A 400 k V, 3-phase line has a surge impedance of 400 Ω . Its SIL is			
	(A)	100 MW	(B)	400 MW
	(C)	1600 MW	(D)	200 MW
36	What is the definition of “Load Factor” ?			
	(A)	Ratio of connected load to maximum demand	(B)	Ratio of peak load to connected load
	(C)	Ratio of average load to maximum demand	(D)	Ratio of installed capacity to average load
37	The Laplace transform exists if the signal is			
	(A)	Periodic with a period T	(B)	Absolutely integrable
	(C)	Bounded	(D)	Exponentially bounded
38	If Norton current is 2 A and Norton resistance is 4 Ω , thevenin voltage is			
	(A)	2 V	(B)	4 V
	(C)	6 V	(D)	8 V
39	An RC circuit has R=10k Ω , and C=10 μ F. The time constant is			
	(A)	0.01 s	(B)	1 s
	(C)	0.1 s	(D)	10 s
40	A bidirectional AC-DC VSC is commonly known as			
	(A)	Line-commutated converter	(B)	PWM rectifier
	(C)	Diode bridge rectifier	(D)	Cycloconverter

41	Ripple frequency of a three-phase bridge rectifier is			
	(A)	f	(B)	2f
	(C)	3f	(D)	6f
42	Select the wrong statement			
	(A)	BJT biased in CE configuration offers 180° phase shift	(B)	BJT biased in common base configuration has high current gain
	(C)	BJT in common base configuration has high voltage gain	(D)	BJT biased in common collector configuration has a voltage gain of unity
43	Which biasing method provides the best thermal stability			
	(A)	Fixed bias	(B)	Collector-to-base bias
	(C)	Voltage divider bias	(D)	Emitter bias without resistor
44	Rotor resistance referred to stator in the equivalent circuit is divided by			
	(A)	Slip	(B)	Frequency
	(C)	Speed	(D)	Load
45	A 500 kVA transformer has constant iron losses of 500 W and full-load copper losses of 2000 W. At what percentage of full load will the efficiency be maximum?			
	(A)	25%	(B)	50%
	(C)	70.7%	(D)	100%
46	The characteristic equation of a system in state-space form is given by			
	(A)	$SI - A = 0$	(B)	$\det(B)$
	(C)	$C(sI - A)^{-1}B$	(D)	$Ax + Bu$
47	The voltage that appears across the contacts immediately after the arc is extinguished is called			
	(A)	Recovery Voltage	(B)	Arc Voltage
	(C)	Supply Voltage	(D)	Restriking Voltage
48	String Efficiency is a term associated with			

	(A) Underground cables	(B) Overhead line insulators
	(C) Transformer windings	(D) DC generators
49	The region of convergence (ROC) of Laplace transform depends on	
	(A) Zeros only	(B) Poles only
	(C) Poles and signal type	(D) Zeros and signal type
50	When two inductors of 200 mH and 800 mH are connected in series, the combination can have a maximum effective inductance of	
	(A) 1900mH	(B) 1800mH
	(C) 800mH	(D) 200mH
51	A 240 V, 50 Hz, single phase energy meter with a meter constant of 800 rev/kWh is carrying a load current of 5 A at upf. The no. of revolutions the meter make in an hour is	
	(A) 960	(B) 1920
	(C) 667	(D) 1333
52	The phenomenon of creep in a single phase induction type energy meter arise due to	
	(A) low control torque	(B) higher deflecting torque
	(C) lower deflecting torque	(D) over compensation due to friction
53	For a causal system, discrete time signals are stable if the poles are	
	(A) on the unit circle	(B) within the unit circle
	(C) outside the unit circle	(D) None of the above
54	The time taken for a surge to travel a 900 km long overhead transmission line is	
	(A) 2.7 ms	(B) 3 ms
	(C) 6 ms	(D) 9ms
55	The non-uniform distribution of voltage across the units in a string of suspension type insulator is due to	

	(A) unequal self capacitance of the units	(B) Non-uniform distance of separation of units from tower body
	(C) the existence of stray capacitance between the metallic junctions of the units and the tower body	(D) Non-uniform distance between the cross-arm and the units
56	A finite impulse response (FIR) system has the region of convergence (ROC)	
	(A) inside the circle	(B) outside the circle
	(C) entire z plane except $z=0$	(D) entire z plane except $z = 0$ and $z = \infty$
57	A casual system is always	
	(A) stable	(B) unstable
	(C) may or may not be stable	(D) cannot be determined
58	The rms and average values of the current $i(t) = 3 + 4 \sin wt + 4 \sin(wt + 60)$ are	
	(A) 5 A, 3 A	(B) 6.4 A, 10 A
	(C) $4\sqrt{2}$ A, 10 A	(D) $4\sqrt{2}$ A, 3 A
59	The average power delivered to a 5Ω resistor by the current $i(t)=5 \cos 10t - 5 \cos 20t$ is	
	(A) Zero	(B) 125 W
	(C) 500 W	(D) 250 W
60	A voltage source of 240 V, 50 Hz with an internal impedance of $(4+3j)$ is supplying power to a complex load impedance Z. The maximum power that can be delivered by the source will be	
	(A) 3600 W	(B) 7200 W
	(C) 11520 W	(D) 5760 W
61	Synchronous motors are usally started by	
	(A) DC supply	(B) Damper winding
	(C) Autotransformer starter	(D) Star delta starter
62	A system with $G(s) = 1/s+2$ is controlled using an integral controller by inserting an integrator in the forward path. The steady state error for the overall system to step input is	

	(A) zero	(B) $1/2$
	(C) ∞	(D) $-\infty$
63	Which of the following is a bounded signal	
	(A) $10 e^{2t}$	(B) $100 t$
	(C) $50 e^{-3t}$	(D) $e^{2t} \sin 3t$
64	The per unit impedance of a circuit element is 0.15. If the base kV and base MVA are halved, the new value of per unit impedance of the circuit element will be	
	(A) 0.075	(B) 0.15
	(C) 0.30	(D) 0.60
65	A resistance strain gauge with a gauge factor of 4 is fixed to a steel frame and is subjected to a stress of 200 N/mm^2 . If the modulus of elasticity of steel is $2 \times 10^5 \text{ N/mm}^2$, the percentage change in resistance is	
	(A) 0.2	(B) 0.002
	(C) 0.004	(D) 0.4
66	A modulus-16 ripple counter is holding the count $(1010)_2$. The count of the counter after 32 clock pulses will be	
	(A) $(1011)_2$	(B) $(1010)_2$
	(C) $(1001)_2$	(D) $(1000)_2$
67	The root locus technique can be used for	
	(A) transient response study	(B) variation of poles of a closed loop system
	(C) calculation of number and angle of asymptotes	(D) all of these
68	For a UJT employed to trigger an SCR, the intrinsic standoff ratio is 0.60 and DC source voltage is 10 V. The UJT would trigger when the emitter voltage is	
	(A) 10 V	(B) 6.3 V
	(C) 6 V	(D) 5.7 V
69	Armature reaction of a synchronous generator at rated voltage and zero power factor lagging is	

	(A) magnetising	(B) demagnetising
	(C) Cross-magnetising	(D) both demagnetising and cross magnetising
70	An SCR can withstand a maximum junction temperature of 100°C when the ambient temperature is 30°C . If the thermal resistance of the SCR from junction to ambient is 1.4°C/W , the maximum internal power dissipation allowed is	
	(A) 98 W	(B) 50 W
	(C) 140 W	(D) 42 W
71	If the steam input to a turbogenerator connected to an infinite busbar is increased, the generator will feed more	
	(A) active power to busbars and its power angle will increase	(B) leading kVAR to busbars without change in power angle
	(C) active power to busbars and its power angle will decrease	(D) lagging kVAR to busbars without change in power angle
72	Damping winding in a synchronous motor is generally used to	
	(A) reduce eddy currents	(B) minimise vibrations
	(C) reduce noise level	(D) prevent hunting and to provide starting torque
73	A continuous time periodic signal $x(t)$ with a period T is convolved with itself. The resulting signal is	
	(A) Periodic with a period T	(B) periodic with a period $2T$
	(C) periodic with a period $T/2$	(D) aperiodic
74	Shunt compensation in EHV transmissin line is used to improve	
	(A) fault level and voltage profile	(B) stability, fault level and voltage profile
	(C) stability and fault level	(D) stability and voltage profile
75	In a synchronous machine, the emf induced by armature reaction flux acts like a voltage drop in	
	(A) inductive impedance	(B) resistance
	(C) capacitive reactance	(D) inductive reactance
76	The system characterised by the equation $y(t) = a x(t) + b$ is	

	(A) linear if $b < 0$	(B) linear if $b > 0$
	(C) linear for any value of b	(D) Non-linear
77	A system with transfer function $G(s) = \frac{(s^2+16)(s+8)}{(s+1)(s+3)(s+4)}$ is excited by $\sin(\omega t)$. The steady state output of the system is zero at	
	(A) 1 rad/s	(B) 3 rad/s
	(C) 4 rad/s	(D) 8 rad/s
78	The number of comparators and resistors required for a 4 bit simultaneous converter type ADC is	
	(A) 4, 4	(B) 12, 16
	(C) 15, 16	(D) 12, 4
79	The pole shoes of a synchronous machine are so shaped that the air-gap is least in the middle and increasing towards the pole edges. This type of construction	
	(A) increases flux/ pole for a given excitation	(B) eliminates lower order harmonics
	(C) gives a nearly sinusoidal output voltage	(D) reduces noise in the machine
80	The period of the sinusoidal signal $x(n) = 10 \cos(2\pi n)$	
	(A) 1	(B) 10
	(C) 5	(D) 20
81	In an RLC series circuit, at a particular frequency (f), voltage across the resistor leads the supply voltage. At this point, the relation of the resonant frequency(f_0) with operating frequency will be	
	(A) $f < f_0$	(B) $f = f_0$
	(C) $f > f_0$	(D) $f = 0$
82	The phase lead compensator is used to	
	(A) increase both rise time and over shoot	(B) increase rise time and decrease overshoot
	(C) decrease both rise time and over shoot	(D) decrease rise time and increase over shoot
83	The power factor of an RLC series circuit at the lower cut-off frequency will be	

	(A) 0.5 lag	(B) 0.5 lead
	(C) 0.707 lag	(D) 0.707 lead
84	The maximum speed of slip ring induction motor with 6% slip is	
	(A) 3000 rpm	(B) 2820 rpm
	(C) 1500 rpm	(D) 1410rpm
85	A NAND gate with positive logic will operate as	
	(A) NOR with negative logic	(B) AND with negative logic
	(C) OR with negative logic	(D) AND with positive logic
86	If the speed of a DC motor increases with load, then it is a	
	(A) shunt motor	(B) series motor
	(C) differentially compounded motor	(D) cumulatively compounded motor
87	Hexadecimal equivalent of the octal number 147.62 is	
	(A) 67.C8	(B) 67.32
	(C) C7.32	(D) C7.C8
88	If the Nyquist plot of a system passes through $(-1 + j0)$ point, then the phase margin of the system will be	
	(A) 0°	(B) 45°
	(C) 90°	(D) 180°
89	In a level compounded generator, the terminal voltage at half full load is	
	(A) same as the full load voltage	(B) same as the no-load voltage
	(C) more than the no-load voltage	(D) less than the no-load voltage
90	A BJT is used as a power control switch, In the ON state, for BJT,	

	(A)	both base-emitter and base-collector junction are reverse biased	(B)	the base emitter junction is reverse biased and base-collector junction is forward biased
	(C)	the base-emitter junction is forward biased and the base-collector junction is reverse biased	(D)	both base-emitter and base-collector junction are forward biased
91	The impedance of a distribution line is $Z=(8+j6) \Omega$. The conductance of the line is			
	(A)	0.125	(B)	0.8
	(C)	0.08	(D)	0.166
92	The voltage applied on a transformer is increased by 50% while the frequency of the same is decreased by 50 %. The maximum core flux density will			
	(A)	become half	(B)	become 1.5 times
	(C)	become 3 times	(D)	Become 4 times
93	The full range of a moving coil instrument is 1 mA. A 0.4Ω resistance is connected in parallel to this instrument to extend its range to 100 mA. Internal resistance of the instrument is			
	(A)	3.96Ω	(B)	39.6Ω
	(C)	40Ω	(D)	19.8Ω
94	An alternator having an induced emf of 1.4 pu is connected to an infinite bus of voltage 1 pu. The bus reactance is 0.3 pu and the alternator reactance is 0.2 pu. The maximum power that can be transferred to the bus is			
	(A)	4.67 pu	(B)	2.8 pu
	(C)	5 pu	(D)	7 pu
95	In order to obtain static voltage equalisation in series connected SCRs, connections are made of			
	(A)	a resistor across the string	(B)	a resistor in series with the string
	(C)	resistors of same values across each SCR	(D)	resistors of different values across each SCR
96	A voltmeter of 0-250 V has an error of 2% of its full scale reading. The maximum limiting error while measuring 200 V using this meter will be			
	(A)	5%	(B)	1.6%
	(C)	2.5%	(D)	2%

97	A balanced 415V, 50 Hz, three phase system is supplying 140 A to a load. When the power is measured by two wattmeter method, one of the wattmeters reads 50.3 kW and the other reads zero. The power factor of the load is			
	(A)	0.707	(B)	0.8
	(C)	0.5	(D)	0.6
98	A generator is supplying to three areas with maximum demands of 100 MW, 200 MW and 300 MW respectively at a diversity factor 1.5. The maximum demand on the station is			
	(A)	300 MW	(B)	400 MW
	(C)	500 MW	(D)	600 MW
99	An independent voltage source with an internal impedance is feeding a load resistor R. For $R = 0 \Omega$ and 10Ω , the respective currents are 10 A and 5A. The value of current for $R = 5 \Omega$ will be			
	(A)	7.5 A	(B)	6.66 A
	(C)	3.75 A	(D)	6 A
100	The starting current of a three phase induction motor is 7 times the rated current and the rated slip is 3%. The ratio of starting torque to full load torque of the machine is			
	(A)	1.47	(B)	0.21
	(C)	1.11	(D)	1.63

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