



Kerala Public Enterprises (Selection and Recruitment) Board

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Version: D

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 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)	0.30	(B)	0.60
	(C)	0.15	(D)	0.075
2	A casual system is always			
	(A)	stable	(B)	may or may not be stable
	(C)	cannot be determined	(D)	unstable

3	The power factor of an RLC series circuit at the lower cut-off frequency will be			
	(A)	0.5 lead	(B)	0.707 lag
	(C)	0.707 lead	(D)	0.5 lag
4	Salient-pole machines are mostly used in			
	(A)	Gas turbine plants	(B)	Thermal power plants
	(C)	Hydro-electric power plants	(D)	Nuclear power plants
5	The characteristic equation of a system in state-space form is given by			
	(A)	$\det(B)$	(B)	$Ax+Bu$
	(C)	$SI - A = 0$	(D)	$C(sI - A)^{-1}B$
6	A finite impulse response (FIR) system has the region of convergence (ROC)			
	(A)	outside the circle	(B)	entire z plane except $z = 0$ and $z = \infty$
	(C)	entire z plane except $z=0$	(D)	inside the circle
7	The voltage that appears across the contacts immediately after the arc is extinguished is called			
	(A)	Arc Voltage	(B)	Recovery Voltage
	(C)	Supply Voltage	(D)	Restriking Voltage
8	The period of the sinusoidal signal $x(n)=10 \cos (2\pi n)$			
	(A)	1	(B)	5
	(C)	20	(D)	10
9	Damping winding in a synchronous motor is generally used to			
	(A)	prevent hunting and to provide starting torque	(B)	reduce noise level
	(C)	reduce eddy currents	(D)	minimise vibrations
10	In regenerative braking, the direction of armature current is			
	(A)	Random	(B)	Opposite to motoring
	(C)	same as motoring	(D)	Zero
11	The phenomenon of creep in a single phase induction type energy meter arise due to			

	(A) over compensation due to friction	(B) low control torque	
	(C) lower deflecting torque	(D) higher deflecting torque	
12	A continuous time periodic signal $x(t)$ with a period T is convolved with itself. The resulting signal is		
	(A) aperiodic	(B) Periodic with a period T	
	(C) periodic with a period $T/2$	(D) periodic with a period $2T$	
13	If the degree of series compensation K is 0.5 (50%), what happens to the power transfer capacity?		
	(A) It is halved	(B) It remains the same	
	(C) It doubles	(D) It increases by 50%	
14	Rotor resistance referred to stator in the equivalent circuit is divided by		
	(A) Speed	(B) Slip	
	(C) Load	(D) Frequency	
15	The upper cut off frequency is mainly limited by		
	(A) Load resistance	(B) Junction and stray capacitances	
	(C) Coupling capacitors	(D) Biasing resistors	
16	Maximum torque of an induction motor occurs when		
	(A) Slip=1	(B) Slip=0	
	(C) Rotor reactance=rotor resistance	(D) Rotor resistance=stator resistance	
17	In the “Two-Wattmeter Method” of measuring 3-phase power, if one wattmeter reads zero, the power factor of the load is		
	(A) 0.5	(B) 0.866	
	(C) 1.0	(D) 0	
18	A bidirectional AC-DC VSC is commonly known as		
	(A) Diode bridge rectifier	(B) Cycloconverter	
	(C) PWM rectifier	(D) Line-commutated converter	

19	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)	0.5	(B)	0.8
	(C)	0.707	(D)	0.6
20	Power MOSFET is a			
	(A)	Power controlled device	(B)	Current-controlled device
	(C)	Voltage controlled device	(D)	Charge controlled device
21	A circuit has a series combination of an inductor, capacitor and resistor, the number of state variables are			
	(A)	3	(B)	0
	(C)	1	(D)	2
22	Early effect in a transistor mainly affects			
	(A)	Output resistance	(B)	Emitter current
	(C)	Base current	(D)	Input impedance
23	V/f control is commonly used in			
	(A)	Induction motor drives	(B)	Synchronous motors only
	(C)	DC drives	(D)	Transformers
24	Select the wrong statement			
	(A)	BJT biased in common collector configuration has a voltage gain of unity	(B)	BJT biased in CE configuration offers 180° phase shift
	(C)	BJT biased in common base configuration has high current gain	(D)	BJT in common base configuration has high voltage gain
25	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 A
	(C)	6.66 A	(D)	3.75 A
26	What is the primary disadvantage of using a purely Proportional (P) controller?			

	(A)	It slows down the system significantly	(B)	It is too complex to tune
	(C)	It introduces a constant steady-state error (offset)	(D)	It makes the system unstable
27	The non-uniform distribution of voltage across the units in a string of suspension type insulator is due to			
	(A)	the existence of stray capacitance between the metallic junctions of the units and the tower body	(B)	Non-uniform distance between the cross-arm and the units
	(C)	unequal self capacitance of the units	(D)	Non-uniform distance of separation of units from tower body
28	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)	$f = 0$
	(C)	$f = f_0$	(D)	$f < f_0$
29	Which ADC is most suitable for high accuracy and noise rejection			
	(A)	Successive approximation	(B)	Pipeline
	(C)	Flash	(D)	Dual slope
30	A 400 k V, 3-phase line has a surge impedance of 400 Ω . Its SIL is			
	(A)	1600 MW	(B)	100 MW
	(C)	400 MW	(D)	200 MW
31	An RC circuit has $R=10\text{k}\Omega$, and $C=10\mu\text{F}$. The time constant is			
	(A)	0.01 s	(B)	10 s
	(C)	0.1 s	(D)	1 s
32	If Norton current is 2 A and Norton resistance is 4 Ω , thevenin voltage is			
	(A)	6 V	(B)	8 V
	(C)	4 V	(D)	2 V
33	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) 667	(B) 1333
	(C) 1920	(D) 960
34	The system characterised by the equation $y(t) = a x(t) + b$ is	
	(A) linear if $b < 0$	(B) Non-linear
	(C) linear if $b > 0$	(D) linear for any value of b
35	The time taken for a surge to travel a 900 km long overhead transmission line is	
	(A) 6 ms	(B) 2.7 ms
	(C) 3 ms	(D) 9ms
36	Which of the following is a bounded signal	
	(A) $50 e^{-3t}$	(B) $e^{2t} \sin 3t$
	(C) $10 e^{2t}$	(D) $100 t$
37	In a 16-bit microprocessor like the 8086, the “Segment Registers” are primarily used for	
	(A) Storing intermediate results	(B) Handling interrupts
	(C) Memory addressing	(D) Arithmetic operations
38	In a level compounded generator, the terminal voltage at half full load is	
	(A) same as the full load voltage	(B) less than the no-load voltage
	(C) more than the no-load voltage	(D) same as the no-load voltage
39	A drop in system frequency indicates	
	(A) Excess reactive power	(B) Excess generation
	(C) High voltage	(D) Load greater than generation
40	If the speed of a DC motor increases with load, then it is a	
	(A) cumulatively compounded motor	(B) differentially compounded motor
	(C) shunt motor	(D) series motor
41	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 1.5 times	(B) become half
	(C) Become 4 times	(D) become 3 times
42	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) 5760 W	(B) 11520 W
	(C) 3600 W	(D) 7200 W
43	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) 50 W	(B) 42 W
	(C) 98 W	(D) 140 W
44	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) 100%	(B) 70.7%
	(C) 50%	(D) 25%
45	During the blocked-rotor test, the slip is	
	(A) Negative	(B) Equal to 1
	(C) Zero	(D) Less than 1
46	Back-to-Back HVDC stations are primarily used to	
	(A) Increase the voltage of a long line	(B) Reduce the cost of insulators
	(C) Interconnect two asynchronous AC grids	(D) Store energy in DC batteries
47	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) 16 kHz	(B) 8 kHz
	(C) 160 kHz	(D) 80 kHz
48	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) 5 pu	(B) 4.67 pu
	(C) 7 pu	(D) 2.8 pu
49	What is the definition of “Load Factor” ?	
	(A) Ratio of average load to maximum demand	(B) Ratio of installed capacity to average load
	(C) Ratio of connected load to maximum demand	(D) Ratio of peak load to connected load
50	A modulus-16 ripple counter is holding the count $(1010)_2$. The count of the counter after 32 clock pulses will be	
	(A) $(1010)_2$	(B) $(1011)_2$
	(C) $(1000)_2$	(D) $(1001)_2$
51	Synchronous motors are usually started by	
	(A) Star delta starter	(B) DC supply
	(C) Autotransformer starter	(D) Damper winding
52	The number of comparators and resistors required for a 4 bit simultaneous converter type ADC is	
	(A) 12, 4	(B) 12, 16
	(C) 15, 16	(D) 4, 4
53	The Laplace transform exists if the signal is	
	(A) Periodic with a period T	(B) Bounded
	(C) Absolutely integrable	(D) Exponentially bounded
54	Why is electrical power transmitted at high voltages over long distances?	
	(A) Because generators only produce high voltage	(B) To increase current flow
	(C) To reduce $I^2 R$ power losses in transmission lines	(D) To make the system safer for domestic use
55	Shunt compensation in EHV transmissin line is used to improve	

	(A)	stability and fault level	(B)	fault level and voltage profile
	(C)	stability, fault level and voltage profile	(D)	stability and voltage profile
56	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)	0.004	(B)	0.2
	(C)	0.002	(D)	0.4
57	Basic comparator is a			
	(A)	NOR gate	(B)	NAND gate
	(C)	AND gate	(D)	XOR gate
58	A BJT is used as a power control switch, In the ON state, for BJT,			
	(A)	the base emitter junction is reverse biased and base-collector junction is forward biased	(B)	both base-emitter and base-collector junction are reverse biased
	(C)	both base-emitter and base-collector junction are forward biased	(D)	the base-emitter junction is forward biased and the base-collector junction is reverse biased
59	Initial current in an RL circuit immediately after switch ON is			
	(A)	Zero	(B)	Infinite
	(C)	Equal to steady-state current	(D)	Maximum
60	In parallel operation of alternators, real power sharing depends on			
	(A)	Prime mover input	(B)	Terminal voltage
	(C)	Excitation	(D)	Armature resistance
61	The region of convergence (ROC) of Laplace transform depends on			
	(A)	Poles only	(B)	Zeros only
	(C)	Zeros and signal type	(D)	Poles and signal type
62	The effect of integral controller on steady state error is			

	(A) Increase steady state error	(B) Increase stability
	(C) Reduce steady state error	(D) No effect
63	Which of the following is an “Active Transducer”?	
	(A) LVDT	(B) Thermistor
	(C) Strain Gauge	(D) Solar Cell
64	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%	(D) 2.5%
65	If the Nyquist plot of a system passes through $(-1 + j0)$ point, then the phase margin of the system will be	
	(A) 90°	(B) 180°
	(C) 0°	(D) 45°
66	If amplitude modulation index is reduced, the output voltage of SPWM inverter	
	(A) Decreases	(B) Increases
	(C) Becomes zero instantly	(D) Remains same
67	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) 8 rad/s	(B) 1 rad/s
	(C) 3 rad/s	(D) 4 rad/s
68	The root locus technique can be used for	
	(A) calculation of number and angle of asymptotes	(B) transient response study
	(C) all of these	(D) variation of poles of a closed loop system
69	Armature reaction of a synchronous generator at rated voltage and zero power factor lagging is	

	(A) Cross-magnetising	(B) demagnetising
	(C) both demagnetising and cross magnetising	(D) magnetising
70	A DC shunt motor runs at 1000 rpm at no load. If flux decreases by 10 %, the new speed (approx.) is	
	(A) 1100 rpm	(B) 1110 rpm
	(C) 900 rpm	(D) 1000 rpm
71	Which biasing method provides the best thermal stability	
	(A) Voltage divider bias	(B) Collector-to-base bias
	(C) Emitter bias without resistor	(D) Fixed bias
72	Ripple frequency of a three-phase bridge rectifier is	
	(A) $6f$	(B) f
	(C) $3f$	(D) $2f$
73	In order to obtain static voltage equalisation in series connected SCRs, connections are made of	
	(A) a resistor across the string	(B) resistors of different values across each SCR
	(C) resistors of same values across each SCR	(D) a resistor in series with the string
74	String Efficiency is a term associated with	
	(A) Overhead line insulators	(B) Transformer windings
	(C) DC generators	(D) Underground cables
75	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) $1/2$	(B) ∞
	(C) $-\infty$	(D) zero
76	CMRR of an op-amp is the ratio of	

	(A) Differential gain to common-mode gain	(B) Input resistance to output resistance
	(C) Output voltage to input voltage	(D) Common-mode gain to differential gain
77	The average power delivered to a $5\ \Omega$ resistor by the current $i(t)=5 \cos 10t - 5 \cos 20t$ is	
	(A) 250 W	(B) Zero
	(C) 500 W	(D) 125 W
78	For a system to be stable, the necessary condition is that all coefficients of the characteristic equation must	
	(A) Have different signs	(B) Be equal to one
	(C) Be negative and non-zero	(D) Be positive and non-zero
79	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) 5.7 V	(B) 10 V
	(C) 6 V	(D) 6.3 V
80	To obtain the signal $y(t)=x(2t-3)$ from $x(t)$, which order of operations is correct?	
	(A) Shift left by 3, then scale (expand) by 2	(B) Shift right by 3, then scale (compress) by 2
	(C) Scale (compress) by 2, then shift right by 3	(D) Scale (expand) by 2, then shift left by 3
81	The shunt resistance circuit component obtained by no load test of an induction motor is the representation of	
	(A) Only copper loss	(B) Only windage and friction loss
	(C) Core loss, windage and friction loss	(D) Only core loss
82	The full range of a moving coil instrument is 1 mA. A $0.4\ \Omega$ resistance is connected in parallel to this instrument to extend its range to 100 mA. Internal resistance of the instrument is	
	(A) $40\ \Omega$	(B) $3.96\ \Omega$
	(C) $19.8\ \Omega$	(D) $39.6\ \Omega$
83	For a causal system, discrete time signals are stable if the poles are	

	(A)	None of the above	(B)	within the unit circle
	(C)	outside the unit circle	(D)	on the unit circle
84	The per-unit impedance of a transformer is			
	(A)	Zero if the transformer is ideal.	(B)	Higher when referred to the primary side
	(C)	The same whether referred to the primary or secondary side	(D)	Higher when referred to the secondary side
85	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)	0.2A	(B)	1.6A
	(C)	0.6A	(D)	6A
86	The impedance of a distribution line is $Z=(8+j6) \Omega$. The conductance of the line is			
	(A)	0.8	(B)	0.166
	(C)	0.125	(D)	0.08
87	A NAND gate with positive logic will operate as			
	(A)	AND with negative logic	(B)	AND with positive logic
	(C)	OR with negative logic	(D)	NOR with negative logic
88	The phase lead compensator is used to			
	(A)	decrease rise time and increase over shoot	(B)	increase both rise time and over shoot
	(C)	decrease both rise time and over shoot	(D)	increase rise time and decrease overshoot
89	Hexadecimal equivalent of the octal number 147.62 is			
	(A)	67.C8	(B)	67.32
	(C)	C7.32	(D)	C7.C8
90	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) eliminates lower order harmonics	(B) gives a nearly sinusoidal output voltage
	(C) increases flux/ pole for a given excitation	(D) reduces noise in the machine
91	The “Lissajous pattern” on an oscilloscope is used to measure	
	(A) Phase difference	(B) Power factor
	(C) Amplitude only	(D) Resistance
92	The maximum speed of slip ring induction motor with 6% slip is	
	(A) 1410rpm	(B) 1500 rpm
	(C) 2820 rpm	(D) 3000 rpm
93	Main advantage of SPWM over square-wave inverter is	
	(A) Simple circuit	(B) Reduced harmonic distortion
	(C) Lower switching losses	(D) Higher DC output
94	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) 1.63	(B) 1.47
	(C) 1.11	(D) 0.21
95	The rms and average values of the current $i(t) = 3 + 4 \sin wt + 4 \sin(wt + 60^\circ)$ are	
	(A) 5 A, 3 A	(B) 6.4 A, 10 A
	(C) $4\sqrt{2}$ A, 3 A	(D) $4\sqrt{2}$ A, 10 A
96	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) 200mH	(D) 800mH
97	If the steam input to a turbogenerator connected to an infinite busbar is increased, the generator will feed more	

	(A)	leading kVAR to busbars without change in power angle	(B)	active power to busbars and its power angle will decrease
	(C)	lagging kVAR to busbars without change in power angle	(D)	active power to busbars and its power angle will increase
98	The Thevenin equivalent resistance is found by			
	(A)	Deactivating independent sources and finding resistance	(B)	Removing load and finding total resistance
	(C)	Short-circuiting all sources	(D)	Measuring load resistance
99	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
100	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)	400 MW	(B)	500 MW
	(C)	600 MW	(D)	300 MW

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