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B.Tech/M.Tech(Integrated) DEGREE EXAMINATION, DECEMBER 2023

First Semester

21EES101T - ELECTRICAL AND ELECTRONICS ENGINEERING

(For the candidates admitted during the academic year 2022-2023 onwards)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 75**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	A potential difference of 10 V is applied across a conductor whose resistance is 2.5 ohm. What is the value of current flowing through it? (A) 4 amperes (B) 2 amperes (C) 6 amperes (D) 10 amperes	1	3	1
2.	Which of the following formulas defines KCL, where i1, i2 represent incoming currents and i3, i4 represent outgoing currents from a circuit node? (A) i1+i2=i3+i4 (B) i1+i3=i2+i4 (C) i1-i2=i3-i4 (D) i4-i1=i2+i3	1	2	1
3.	Pick out the correct statement from the following about parallel combination of resistors. (A) The current across the resistors are the same (B) The resistance offered by all resistors are the same (C) The potential difference is same across each resistor (D) The equivalent overall resistance is larger than the largest resistor	1	2	1
4.	What is the type of current obtained by finding the square of the currents and then finding their average and then finding the square root? (A) RMS current (B) Average current (C) Instantaneous current (D) Total current	1	2	1
5.	Which of the following terminal does not belong to the MOSFET? (A) Drain (B) Gate (C) Base (D) Source	1	1	2
6.	Which of the following the charge carrier is available in BJT? (A) Holes (B) Electrons (C) Neutrons (D) Both holes and electrons	1	1	2
7.	The approximate equivalent circuit of an IGBT consists of (A) a BJT & a MOSFET (B) a MOSFET & a MCT (C) two BJTs (D) two MOSFETs	1	2	2
8.	The NOR gate output will be high if the two inputs are _____ (A) 00 (B) 01 (C) 10 (D) 11	1	3	2
9.	The basic function of a transformer is to change (A) the level of the voltage (B) the power level (C) the power factor (D) the frequency	1	1	3
10.	An 50 Hz induction motor with 1000 rpm speed will have (A) 2 poles (B) 6 poles (C) 4 poles (D) 8 poles	1	3	3

11.	The direction of rotation of motor is determined by _____ (A) Faraday's law (B) Lenz's law (C) Coulomb's law (D) Fleming's left-hand rule	1	1	3
12.	Which of the following motor rotates in discrete angular steps? (A) Servo motor (B) DC motor (C) Stepper motor (D) Linear Induction Motor	1	1	3
13.	The function of transducer is to convert (A) Electrical signal into non electrical quantity (B) Non electrical quantity into electrical signal (C) Electrical signal into mechanical quantity (D) Non electrical quantity into mechanical signal	1	1	4
14.	With the increase in the intensity of light, the resistance of a photovoltaic cell (A) Increases (B) Decreases (C) Remains same (D) become negative	1	1	4
15.	What is the principle of operation of LVDT? (A) Mutual inductance (B) Self-inductance (C) Permanence (D) Reluctance	1	1	4
16.	By which properties, the orientation of molecules in a layer of liquid crystals can be changed? (A) Magnetic field (B) Electric field (C) Electromagnetic field (D) Galois field	1	1	4
17.	The voltage of the single phase supply to residential consumers is (A) 110 V (B) 210 V (C) 230 V (D) 400 V	1	1	5
18.	The capacity of a battery is expressed in terms of (A) Current rating (B) Voltage rating (C) Ampere hour rating (D) Power rating	1	1	5
19.	Chemical energy is converted to _____ energy by a fuel cell (A) solar (B) electrical (C) potential (D) mechanical	1	1	5
20.	For a consumer most economic power factor is (A) 0.5 lagging (B) 0.5 leading (C) 0.95 lagging (D) 0.95 leading	1	2	5

PART - B (5 × 8 = 40 Marks)

Answer **all** Questions

		Marks	BL	CO
21.	(a) Compare the star and delta connections of three phase AC system with suitable diagrams. Also mention the relation between phase and line voltage, phase and line current	8	2	1
	(OR)			
	(b) With a suitable circuit and waveform, explain the working of full wave bridge rectifier with filter			
22.	(a) Describe the construction, working and V-I characteristics of JFET	8	1	2
	(OR)			
	(b) Interpret sum of product (SOP) and product of sum (POS) using relevant logic circuit and Boolean expression			

23.	(a) Explain the construction and working of single phase transformer	8	1	3
	(OR)			
	(b) Briefly explain about the selection of drives for the real time applications such as lift, cranes and pumps			
24.	(a) Briefly explain the working of Digital Storage Oscilloscope (DSO) with relevant block diagram	8	1	4
	(OR)			
	(b) Explain about thermocouple with suitable diagrams			
25.	(a) Describe the difference between traditional grid and smart grid	8	2	5
	(OR)			
	(b) Explain in detail about the types of electric vehicles			

PART - C (1 × 15 = 15 Marks)	**Marks**	**BL**	**CO**
Answer **any 1** Questions			
26. A 240 V, 50 Hz AC supply is applied a coil of 0.08 H inductance and 4 Ω resistance connected in series with a capacitor of 8 μF. Calculate Impedance, Circuit current, phase angle between voltage and current, power factor and power consumed.	15	4	1
27. Simplify the given 4 variable Boolean using the Karnaugh map and implement it using logic gates. $F(A, B, C, D) = \Sigma(0, 2, 5, 7, 8, 10, 13, 15)$	15	3	2

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