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Question Paper Code : 10227

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Second Semester

Aeronautical Engineering

BE3251 — BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to : Aerospace Engineering/Automobile Engineering/Biomedical Engineering/Computer Science and Design/Computer Science and Engineering/Computer Science and Engineering (Artificial Intelligence and Machine Learning)/Computer Science and Engineering (Cyber Security)/Computer Science and Engineering (Data Science)/Computer and Communication Engineering/Industrial Engineering /Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Materials Science and Engineering/Mechanical Engineering/Mechanical Engineering (Sandwich)/Mechanical Engineering (Specialised in Automobile)/Mechanical Engineering (Specialised in Smart Manufacturing)/Medical Electronics/Production Engineering/Safety and Fire Engineering/Artificial Intelligence and Data Science/Computer Science and Business Systems/Information Technology)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchhoff's voltage law and Kirchhoff's current law.
2. Differentiate between real power and reactive power.
3. Write the EMF equation of DC generator.
4. Mention the applications of synchronous motor.
5. How does a transistor act as a switch?
6. Compare JFET with BJT.
7. Convert the decimal code $(72.45)_{10}$ into binary.

8. Write the basic properties of Boolean algebra.
9. List out the common errors present in energy meter.
10. List the functions of CT and PT.

PART B — ($5 \times 13 = 65$ marks)

11. (a) (i) Find the loop currents I_1 , I_2 and I_3 for the network of Fig.1 by mesh analysis. (7)

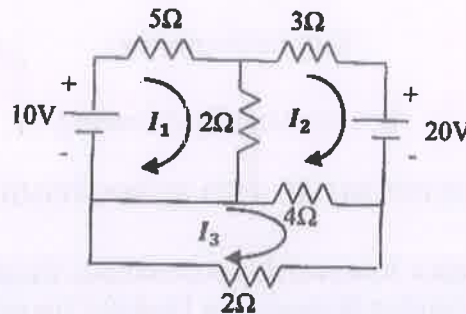


Fig. 1

- (ii) Find the voltage across A and B in the circuit shown in Fig. 2 (6)

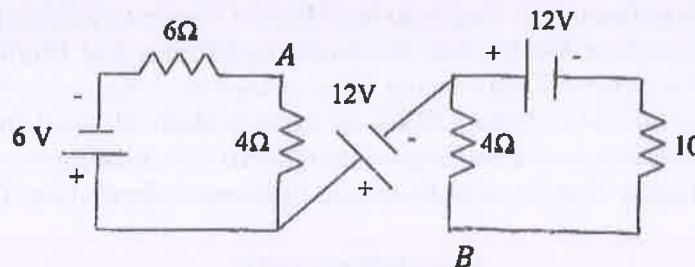


Fig.2

Or

- (b) (i) A series RLC circuit consists of $R = 10 \Omega$, $L = 0.1 \text{ H}$ and $C = 100 \mu\text{F}$ is connected to a 230 V, 50 Hz AC supply. Calculate the impedance, power and power factor. (7)
- (ii) Find the Average and RMS values of the waveform shown in Fig.3 (6)

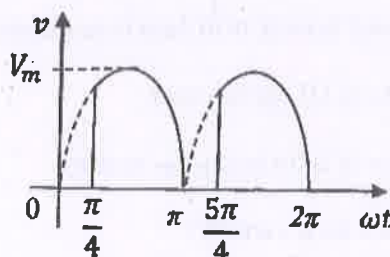


Fig. 3

12. (a) Discuss the principle of working and functions of various parts present in DC machine construction by using suitable diagram.

Or

- (b) (i) Derive an expression for the EMF equation of transformer. (7)
(ii) Compare the synchronous motor with induction motor. (6)
13. (a) (i) Describe the operation of full-wave rectifier with suitable diagram. (7)
(ii) Compare the PNP and NPN transistors. (6)

Or

- (b) (i) Describe the working and V-I characteristics of SCR with suitable diagram. (7)
(ii) Describe how FET act as voltage controlled resistor with suitable diagram. (6)
14. (a) Reduce the following expression in SOP and POS forms using K-map technique and implement the minimal expression using suitable logic gates.

$$f(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15)$$

Or

- (b) (i) Write the function of error correction code and Explain how Hamming code corrects the errors with suitable example. (7)
(ii) Implement the Half Adder using suitable logic gates and Realize the expressions. (6)
15. (a) (i) Discuss the functional elements of an instrument with a neat block diagram. (7)
(ii) Compare the Moving Coil (MC) and Moving Iron (MI) Instrumentation. (6)

Or

- (b) Discuss the construction and working of digital storage oscilloscope (DSO) with neat block diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Analyse the breakdown operation of PN junction diode and Zener diode with suitable V-I characteristics and compare the features and applications of PN junction and Zener diode.

Or

- (b) Derive an expression for the Torque equation of DC motor and analyze the performance of DC shunt and series motor by using the mechanical characteristics and mention their applications.
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