Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20182

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Second Semester

Mechanical Engineering

BE 3251 — BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to : Aeronautical Engineering/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 and Communication Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/ Marine Engineering/Materials Science and Engineering/Mechanical Engineering (Sandwich)/ Medical Electronics/Production Engineering/ Safety and Fire Engineering/Artificial Intelligence and Data Science/ Computer Science and Business Systems/Information Technology)

(Regulations 2021)

(Also common to PTBE 3251 for B.E. (Part-Time) for Mechanical Engineering – Regulations 2023)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the factors affecting resistance?
2. Define the terms :
   (a) Form Factor
   (b) Peak Factor.
3. Distinguish between DC Motor and DC Generator.
4. Formulate the EMF equation for Transformer.
5. Define Knee voltage or Junction barrier voltage for PN Junction diode.
6. List the applications of IGBTs.
7. Convert $(634)_8$ to binary.
8. Give the truth table of XOR gate.
9. List the functional elements of the measurement systems.
10. What is the use of energy meter?

PART B — (5 × 13 = 65 marks)

11. (a) (i) State and explain Kirchhoff's voltage law. (4)

(ii) Calculate the loop currents I_1 and I_2 for the circuit shown in Fig.11(a)(i) using mesh analysis. (9)

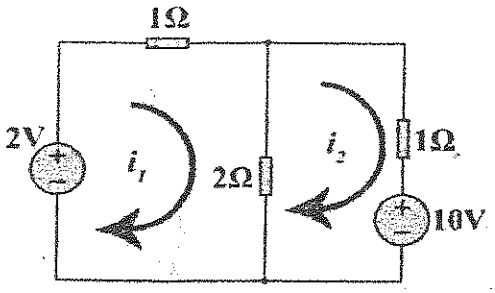

Fig.11(a)(i)

Or

(b) (i) Derive the expression for RMS value of an alternating quantity. (5)

(ii) A series circuit has R = 10Ω, L = 50 mH, and C = 100 μF and is supplied with 200 V, 50 Hz. Find

(1) impedance

(2) current

(3) power

(4) power factor

(5) voltage drop across the each element. (8)

12. (a) (i) Derive the E.M.F equation of DC generator. (5)

(ii) Describe the working principle of DC motor with neat sketch. (8)

Or

(b) Explain the construction and principle of operation of three phase induction motor. (13)

13. (a) Describe the working of a PN junction diode with neat diagram. Also explain its V-I characteristics. (13)

Or

(b) Explain with a neat sketch the construction and working characteristics of IGBT. (13)

14. (a) (i) Design and explain the working of Gray to BCD converter. (9)

(ii) Convert 95.0625_{10} binary. (4)

Or

(b) Express the function $Y = A + B'C$ in

(i) canonical SOP and

(ii) canonical POS form. (13)

15. (a) Explain the construction and operation of moving iron attraction type instrument. (13)

Or

(b) Describe with the help of block diagram the working of a typical DSO. (13)

PART C — ($1 \times 15 = 15$ marks)

16. (a) Explain in detail about any one method of three phase power measurement.

Or

(b) Explain in detail about the steady state response of simple RLC circuit with an numerical example.

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