Reg. No. : | E | N | G | G | T | R | E | E | . | C | O | M |

Question Paper Code : 60016

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Second Semester

BE 3251 — BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to : Aeronautical Engineering/Aerospace Engineering/Automobile Engineering/Biomedical Engineering/Computer Science and Engineering/Computer and Communication Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical 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)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Consider the circuit shown in figure 1. Determine the current I.

Figure 1

2. Write Down the expressions for active power and apparent power.

3. A six pole lap wound DC generator has 720 conductors a flux of 40 mwb per pole is driven at 400 rpm, find the generated emf.

4. List out the application of transformers.

5. Name the four regions of operation of transistors.

6. Differentiate the operation of rectifiers and inverters.

7. Convert the given expression in canonical SOP form Y = AC+AB+BC.

8. Mention the significance of K-map.

9. Name the constructional parts of induction type energy meter.

10. How are the errors caused in potential transformers?

PART B — (5 × 13 = 65 marks)

11. (a) Determine the currents in the 8Ω resistor in the circuit shown in figure 2. using mesh analysis. (13)
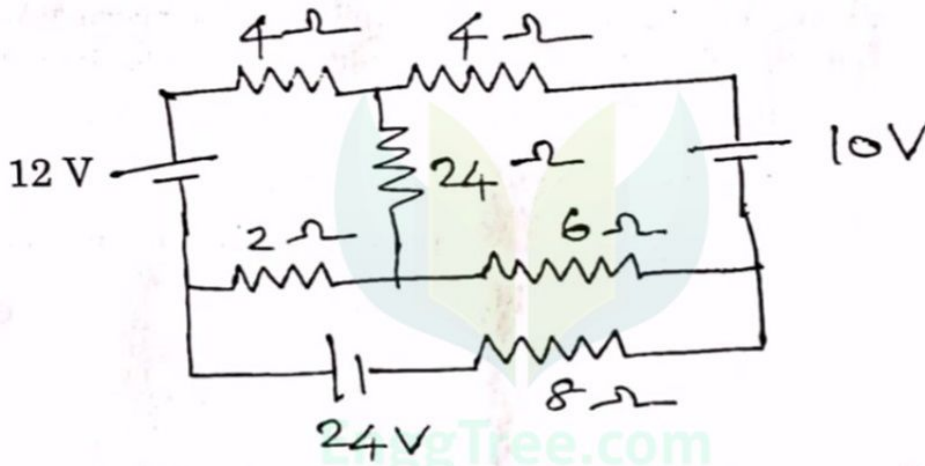

Figure 2

Or

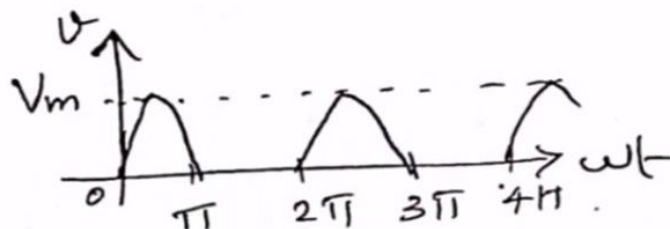(b) Find the form factor of the half wave rectified sine wave shown in figure. 3. (13)

Figure 3

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12. (a) With neat diagrams explain the construction and working principle of DC generator.

Or

(b) (i) Explain the types of DC motors characteristized by the connections of field winding in relation to the armature.

(ii) Compare the operation of transformer and induction motor.

13. (a) Explain in detail the construction, principle of operation and VI characteristics of PN junction diode.

Or

(b) Explain the constructional details and different modes of operation of MOSFET.

14. (a) Given the logical equation $Y = (A + \overline{B}C)(C + AB)$

(i) Design a circuit using AND and OR gates to realize the above function. (8)

(ii) Realize the above function using only NAND and only NOR gates after simplification. (8)

Or

(b) For the truth table 1, obtain the simplified sum of products expression using k-map and realize it using only NAND gates. Observe that this is the output of a majority voting circuit.

Truth table 1

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

15. (a) Explain the measurement of power in three phase circuits using two-wattmeter method.

Or

(b) Draw the functional block diagram of Data Acquisition system and explain the role of each component.

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PART C — (1 × 15 = 15 marks)

16. (a) Find the current in the 10Ω resistance and voltage in the 2Ω resistance in the circuit shown in Figure 4 using node analysis.
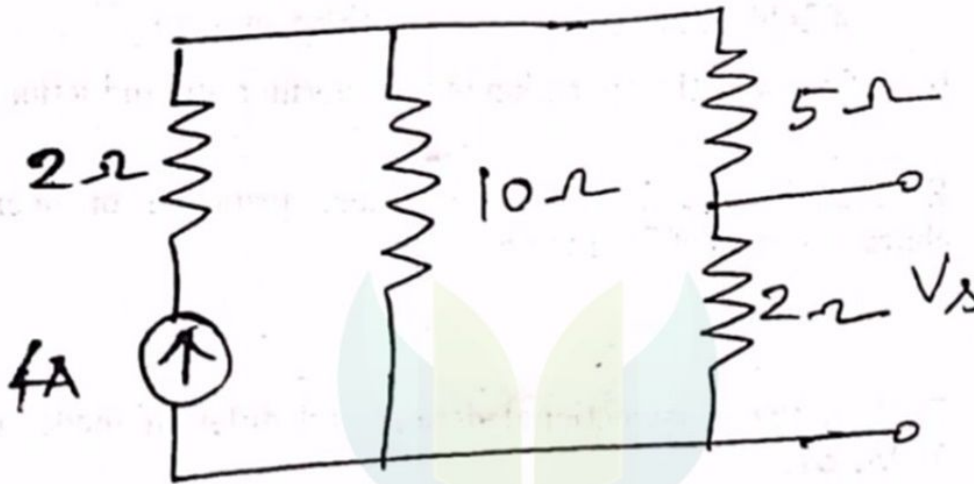

Figure 4

Or

(b) In the circuit shown in figure 5, determine the total impedance, current I, phase angle θ and the voltage across each element.
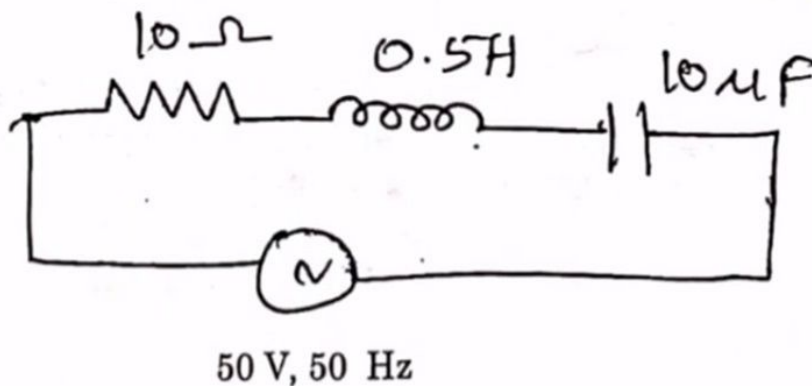

50 V, 50 Hz

Figure 5