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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester B.Tech Degree Regular and Supplementary Examination June 2023 (2019 Scheme)

Course Code: EST130

Course Name: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(2019 -Scheme)

PART I : BASIC ELECTRICAL ENGINEERING

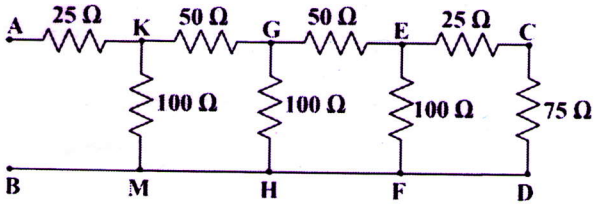
Max. Marks: 50 Duration: 90 min

PART A

Answer all questions, each carries 4 marks Marks

1 State and explain Kirchhoff's laws. (4)

2 Find the equivalent resistance across AB. (4)



3 An alternating current is given by $I = 50\sin(314t)$. Find (a) the maximum value (b) frequency (c) time period of the current. (4)

4 Explain the phasor diagram and impedance triangle of a series resistive inductive circuit excited by an AC source. (4)

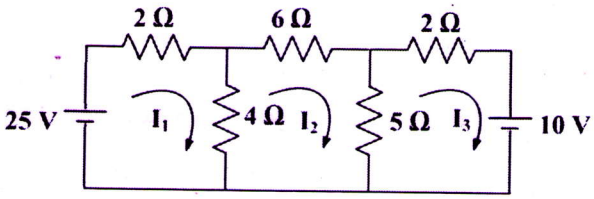
5 Two impedances, $Z_1 = (4+j3)\ \Omega$, $Z_2 = (6 - j9)\ \Omega$ are connected in series. Find the equivalent impedance in polar form. (4)

PART B

Answer one full question from each module, each question carries 10 marks.

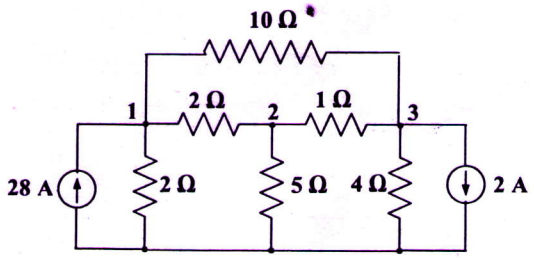
MODULE 1

6 Solve for the mesh currents in the given circuit. (10)



OR

7 Determine the node voltages in the given circuit. (10)



MODULE 2

8 a A rectangular shaped core wound with a coil of 150 turns and 1.2A is made of mild steel plate 10 mm × 20 mm cross-section. The mean length of the magnetic path is 15cm. Calculate i. magnetizing force ii. flux density iii. reluctance iv. flux of magnetic circuit. Assume relative permeability of mild steel as 940. (6)

b State and explain Faraday's laws of electromagnetic induction. (4)

OR

9 Explain in detail the dynamically and statically induced emfs. An air solenoid has 300 turns, its length is 25 cm and cross sectional area of 3 cm^2 . Calculate the self-inductance. If the coil current of 10A is completely interrupted in 0.04 s, calculate the induced emf in the coil. (10)

MODULE 3

10 A resistor of 10 Ω , an inductor of 0.3 H and a capacitor of 100 μF are connected in series across a 230 V, 50 Hz, single phase ac supply. Determine (a) impedance (b) current (c) power in watts (d) circuit power factor. (10)

OR

11 Three impedances each having resistance 20Ω and an inductive reactance of 15Ω are connected in star across a 400V, 3 phase, AC supply. Calculate (a) the line current (b) power factor (c) total power. If the load is connected in delta, determine the total power consumed by the load. (10)

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PART 2 : BASIC ELECTRONICS ENGINEERING

Max. Marks: 50 Duration: 90 min

PART A

Answer all questions, each carries 4 marks Marks

12 What are the merits and demerits of resistor colour coding schemes? (4)

13 With the help of volt-ampere characteristics, explain the working of a PN junction diode. (4)

14 Draw the circuit of voltage divider biasing arrangement and mention the functions of various components used in the circuit. (4)

15 Explain the block diagram of an instrumentation system. (4)

16 Compare AM and FM. (4)

PART B

Answer one full question from each module, each question carries 10 marks.

MODULE 4

17 a. What do you mean by permeability tuning? Identify and sketch any one electronic component which employs permeability tuning and explain the tuning mechanism. (4)

b. Discuss the parameters 'alpha' and 'beta' of a transistor and quote the relationship between them. The collector current of a transistor varies by 1.987 mA when its emitter current is varied by 2 mA. Compute alpha and beta of the transistor. (6)

OR

18 Draw and explain the input and output characteristics of a transistor in common emitter configuration. With a neat diagram, mention any one application of transistor in common emitter configuration. (10)

MODULE 5

19 a. Draw the circuit diagram of a simple zener voltage regulator and explain its working. Define the terms line regulation and load regulation. (6)

b. Draw and explain the block diagram of a public address system. (4)

OR

20 a. Sketch and explain the working of a full wave bridge rectifier with capacitor filter. Suggest methods to reduce the ripple content of the output. (6)

b. Plot the frequency response of a RC coupled amplifier and justify the shape of the curve. (4)

MODULE 6

21 a. Explain the term 'modulation index' in a radio communication system. An AM modulated carrier wave has maximum and minimum amplitudes of 600 mV and 450 mV respectively. Find the modulation index. (4)

b. Discuss the concepts of cell splitting and frequency reuse in a cellular communication system. (6)

OR

22 Draw the block diagram of a GSM system and explain its working principle. (10)

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