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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017

Course Code: **EE100**

Course Name: **BASICS OF ELECTRICAL ENGINEERING**

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each question carries 4 marks.

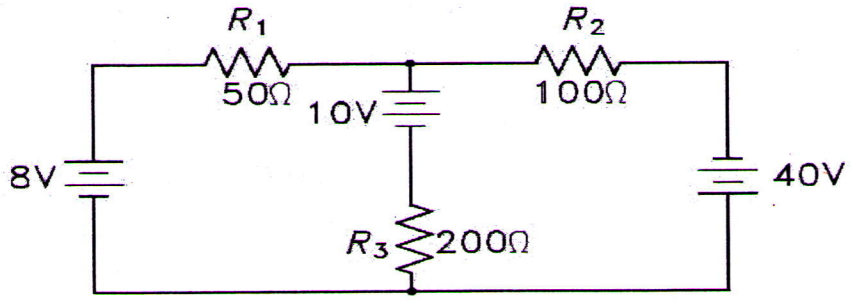
1. A resistor of 5 Ω is connected in parallel with a resistor of R_1 Ω. This combination is connected in series with an unknown resistor of R_2 Ω and the complete circuit is then connected to 50 V dc supply. Calculate the values of R_1 and R_2, if the power dissipated by the unknown resistor R_1 is 150 W with 5A passing through it.
2. Derive an expression for energy stored in a magnetic circuit.
3. What are the advantages of three phase systems?
4. Derive an expression for three phase power in a star connected system.
5. What are the advantages of renewable sources?
6. What are the advantages of high voltage transmission?
7. What are the losses in a transformer? How these losses can be reduced?
8. With the help of diagrams, explain how dc motors are classified.
9. Define synchronous speed and slip of a three phase induction motor.
10. Explain the constructional details of a single phase induction motor.

PART B

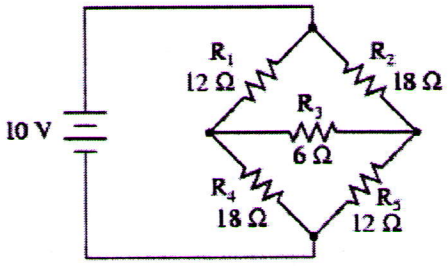
MODULE (1-4)

Answer any four questions, each question carries 10 marks

11. a. Determine the power dissipated in all the three resistors in the following figure using mesh current analysis. (5)



b. Determine the current drawn from the supply using start delta conversion. (5)



12. a. A steel ring of 20 cm^2 cross-section having a mean diameter of 50 cm is wound uniformly with 500 turns. Flux density of 1.0 Wb/ m^2 is produced by 4000 ampere turns per metre. Calculate (i) the inductance (ii) the exciting current and (iii) the inductance when a gap of 1 mm long is cut in the ring, the flux density being 1.0 Wb/ m^2. Neglect leakage and fringing. (7)

b. A conductor of length 0.5 m moves in a uniform magnetic field of density 1.1 T at a velocity of 30 m/s. Calculate the induced voltage in the conductor when the direction of motion is inclined at 60^0 to the direction of the field. (3)

13. a. Derive the form factor of a pure sinusoidal wave form. (5)

b. An alternating voltage of (80 + j60) V is applied to a circuit and the current flowing is (-4 + j10) A. Find (i) the impedance of the circuit, (b) the power consumed and (c) the phase angle. (5)

14. a. Each phase of a delta connected load has a resistance of 25 Ω and an inductance of 0.15 H. The load is connected across a 400 V, 50 Hz, three phase supply. Determine the line current, power factor and power consumed. (5)

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b. A balanced three phase star connected load is connected across a 400 V three phase ac supply. Power consumed by the load is measured using two wattmeter method. The readings of the two wattmeters are -500 W and 1500 W. Find the current drawn from the supply and the power factor of the load. (5)

15. With the help of a neat diagram, explain the working of a thermal power plant. (10)

16. a. With the help of a diagram, explain a power transmission scheme. (5)

b. What are the equipments in a substation? Explain the function of each equipment. (5)

MODULE 5

Answer any one full question

17. a. What are the parts of a dc generator? Explain each part. (5)

b. A 150 kVA transformer has an iron loss of 700 W and a full load copper loss of 1800 W. Calculate the efficiency at full load, 0.8 power factor lagging. (5)

OR

18. a. A 120 V dc shunt motor draws a current of 200 A. The armature resistance is 0.02 Ω and shunt field resistance 30 Ω. Find the back emf. (5)

b. A 30 kVA, single phase transformer has 500 primary turns and 30 secondary turns. The primary is connected to a 3300V, 50 Hz supply. Calculate (i) the maximum flux in the core, (ii) the secondary emf , (iii) the primary and secondary currents. (5)

MODULE 6

Answer any one full question

19. a. How does a three phase induction motor start? (5)

b. What are the different types of three phase induction motors? What are their advantages and disadvantages? (5)

OR

20. a. The frequency of the emf in the stator of a 4 pole induction motor is 50 Hz, and that in the rotor is 1.5 Hz. What is the slip and at what speed is the motor running? (5)

b. Why a single phase induction motor is not self starting? How it can be made self starting? (5)

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