

Reg. No. \_\_\_\_\_

Name: \_\_\_\_\_

**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.*

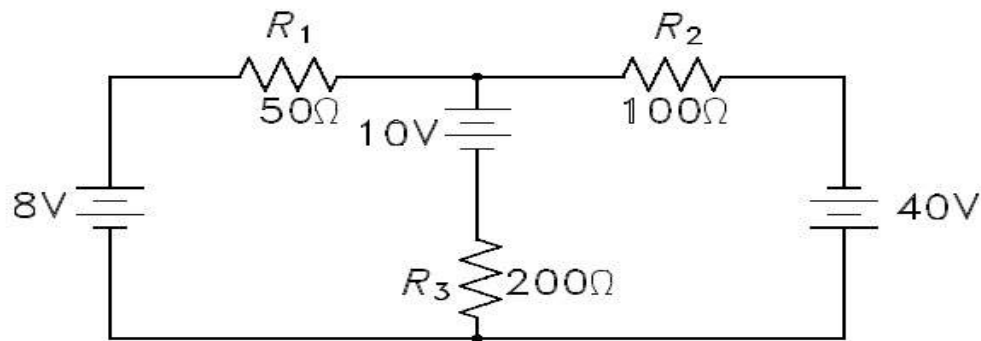
1. A resistor of  $5 \Omega$  is connected in parallel with a resistor of  $R_1 \Omega$ . This combination is connected in series with an unknown resistor of  $R_2 \Omega$  and the complete circuit is then connected to 50 V dc supply. Calculate the values of  $R_1$  and  $R_2$ , if the power dissipated 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**

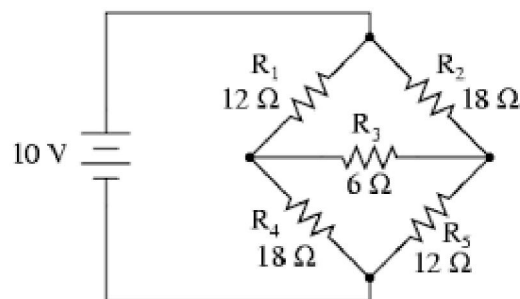
**MODULE (1-4)**

*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 star delta conversion. (5)



12. a. A steel ring of  $20 \text{ cm}^2$  cross-section having a mean diameter of 50 cm is wound uniformly with 500 turns. Flux density of  $1.0 \text{ Wb/m}^2$  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  $1.0 \text{ Wb/m}^2$ . 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  $60^\circ$  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  $(80 + j60) \text{ V}$  is applied to a circuit and the current flowing is  $(-4 + j10) \text{ A}$ . 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  $25 \Omega$  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)

- 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  $\Omega$  and shunt field resistance 30  $\Omega$ . 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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