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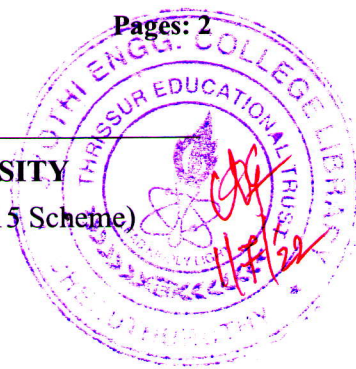
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S1 (S,FE) S2 (S) / S2 (FE) Examination May 2022 (2015 Scheme)



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

Marks

- 1 Three lamps are connected in series across a 180 V supply and take a current of 2.5 A. If the resistance of two of the lamps is 30Ω each, what is the resistance of the third lamp? (4)
- 2 Distinguish between ideal current source and practical current source. (4)
- 3 Derive the expression for energy stored in an inductor. (4)
- 4 State Faraday's law of electromagnetic induction. (4)
- 5 Derive the relation between V_L and V_{ph} , I_L and I_{ph} of a star connected system. (4)
- 6 Explain the phasor diagram of a RL circuit. Give expression for impedance and power factor? (4)
- 7 Differentiate between feeders and distributors. (4)
- 8 Derive the emf equation of a DC generator. (4)
- 9 Enumerate the losses of a transformer. (4)
- 10 Why is single phase induction motor not self-starting? Suggest one method for starting of single phase induction motor (4)

PART B

MODULE (1-4)

Answer any four questions, each carries 10 marks

- 11 a) A battery of emf 40V and internal resistance 2Ω is connected in parallel with a second battery of 44V and internal resistance 4Ω . A load resistance of 6Ω is connected across the ends of the parallel circuit. Calculate the current in each battery and in the load. (Solve using matrix method). (7)
- b) State and explain Kirchhoff's laws. (3)
- 12 a) A circular magnetic circuit has a mean length of iron 50cm and an airgap of 1mm. It is wound with a coil of 500turns carrying a current of 3A. The cross-

sectional area of the core is 10cm^2 . The mmf required for the airgap is 60% of the total mmf. Find the magnetic flux and total reluctance. Relative permeability of iron is 750.

- b) Compare Electric and Magnetic circuits. (4)
- 13 a) An alternating voltage has the equation $v = 141.4 \sin 377t$, what are the values of (i) r.m.s voltage, (ii) frequency (iii) instantaneous voltage when $t = 3 \text{ ms}$ (5)
- b) Explain active, reactive and apparent power (5)
- 14 a) A circuit having a resistance of 12Ω , an inductance of 0.15 H and a capacitance of $100 \mu\text{F}$ in series is connected across a 100 V , 50 Hz , supply. Calculate (i) impedance, (ii) current (iii) V_R , V_L , V_C (iv) phase angle ϕ (7)
- b) Derive the form factor of a sinusoidal waveform. (3)
- 15 a) Draw a neat block diagram of thermal power plant (5)
- b) Enumerate the advantages of high voltage transmission (5)
- 16 Explain the substation equipments? (10)

MODULE 5

Answer any one full question

- 17 a) A four pole motor is fed at 440 V and takes an armature current of 50 A . The resistance of the armature circuit is 0.28Ω . The armature winding is wave connected with 888 conductors and the useful flux/pole is 0.023 Wb . Calculate the speed. (5)
- b) Explain Back emf? (5)

OR

- 18 Explain the working principle of a single phase transformer and derive its emf equation (10)

MODULE 6

Answer any one full question

- 19 Explain in detail the working principle of three phase induction motor (10)

OR

- 20 a) A three phase I/M is wound for 4 poles and is supplied from a 50 Hz system. Calculate (i) Synchronous speed (ii) speed of the rotor when the slip is 4% (iii) rotor frequency when the speed of the rotor is 600 rev/min (4)
- b) Explain slip of an induction machine (3)
- c) Compare squirrel cage and slip ring I/M (3)
