Code No: **R201214** **R20** **SET - 1**

I B. Tech II Semester Supplementary Examinations, Jan/Feb-2024

BASIC ELECTRICAL ENGINEERING

(Common to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

~~~~~~

UNIT -I

1 a) Explain the principle of operation of DC generator. [7M]

b) A 220 V d.c series motor has armature and field resistances of 0.15 Ω and 0.10 Ω respectively. It takes a current of 30 A from the supply while running at 1000 rpm. If an external resistance of 1 Ω is inserted in series with the motor, calculate the new steady state armature current and the speed. Assume the load torque is proportional to the square of the speed. [7M]

(OR)

2 a) Obtain the expression for the EMF developed in DC generator. [7M]

b) A 200 V, d.c shunt machine has an armature resistance of 0.8 Ω and field resistance of 150 Ω. The machine is running at 1000 rpm as a motor drawing 20 A from the supply mains. Calculate the speed at which the machine must be driven to achieve this as generator. [7M]

UNIT-II

3 a) Explain the principle of operation of single phase transformer in detail. [7M]

b) An ideal transformer has a primary winding of 200 turns. On the secondary side the number of turns between A and B is 600 and between B and C is 400 turns, that between A and C being 1000. The transformer supplies a resistor connected between A and C which draws 10 kW. Further, a load of $2000\angle -45°$ Ω is connected between A and B. The primary voltage is 2 kV. Find the primary current. [7M]

(OR)

4 a) Discuss in detail about Sumpner's test. [7M]

b) A 50 kVA, 2200/110 V transformer when tested gave the following results: [7M]

OC test, measurements on the LV side: 400 W, 10 A, 110 V

SC test, measurements on the HV side; 808 W, 20.5 A, 90 V.

Compute all the parameters of the equivalent circuit referred to the HV side of the transformer.

UNIT-III

5 a) Explain the principle of operation of alternator with neat sketch. [7M]

b) Develop the equivalent circuit of synchronous motor and explain. [7M]

(OR)

6 a) Explain the constructional features of alternators in detail. [7M]

b) A synchronous generator is supplying zero power factor (i) lagging and (ii) leading current. Show that the terminal voltage V_t and the excitation emf E_f are in phase. [7M]

|''|''|||''|'''|||'|
~~~~~~

Code No: **R201214** **R20** **SET - 1**

UNIT-IV

7 a) What are the methods to start an induction motor? Explain [7M]

b) A 6-pole, 50 Hz, 3-phase induction motor running on full-load develops a useful torque of 150 Nm and the rotor emf is observed to make 100 cycles/min. Calculate the net mechanical power developed. If the torque loss in wind age and friction is 12 Nm, find the copper-loss in rotor windings, the input to the motor and efficiency. Given: stator losses 600 W (inclusive of wind age and friction loss). [7M]

(OR)

8 a) Explain about brake test on induction motor [7M]

b) A 3.3 kV, 20-pole, 50 Hz, 3-phase, star connected induction motor has a slip-ring rotor of resistance 0.02 Ω and standstill reactance of 0.2 Ω per phase. The motor has a speed of 294 rpm when full-load torque is applied. Compute (i) slip at maximum torque, and (ii) the ratio of maximum to full-load torque. Neglect stator impedance. [7M]

UNIT-V

9 a) Explain the principle of operation of AC servo motor. [7M]

b) What are the applications of shaded pole motor? Explain. [7M]

(OR)

10 a) Explain the detailed construction of single phase induction motor. [7M]

b) How shaded pole motor is different from induction motor? Explain. [7M]

***