Code No: **R19ES1211** **R19** **SET - 1**

I B. Tech II Semester Supplementary Examinations, January/February - 2023
BASIC ELECTRICAL ENGINEERING
(Common to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks
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UNIT-I

1. a) Derive the emf equation of a DC machine. [8M]

   b) A shunt generator has an induced voltage on open circuit of 127 V When the machine is on load the terminal voltage is 120 V Find the load current if the field circuit resistance be 15 Ω and the armature resistance 0.02 Ω. Ignore armature reaction. [7M]

(OR)

2. a) Explain the working of Three-point starter with a neat circuit diagram. [8M]

   b) The armature of a 4-pole shunt motor has a lap winding accommodated in 60 slots, each containing 20 conductors. If the useful flux per pole is 23 mWb, calculate the total torque developed when the armature current is 50 A. [7M]

UNIT-II

3. a) Distinguish in detail between a core type and a shell type transformer. [8M]

   b) A single-phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of the core is 60 cm^2. If the primary is connected to a 50 Hz supply at 500 V, determine (i) the peak value of the flux density in the core and (ii) the voltage induced in the secondary winding. [7M]

(OR)

4. a) Explain how R_0 and X_0 can be obtained from the no – load test or open circuit test of a Single-phase transformer. [8M]

   b) Calculate the efficiencies at half and full load of a 100 KVA transformer for power factor of (i) unity (ii) 0. 8. The copper loss is 1000 watt at full load and the iron loss is 1000 watts. [7M]

UNIT-III

5. a) Explain the constructional details of an alternator with a neat diagram and required labeling. [8M]

   b) A 3-phase, star-connected alternator supplies a load of 10 MW at power factor 0.85 lagging and at 11 kV (terminal voltage). Its resistance is 0.1 ohm per phase and synchronous reactance 0.66 ohm per phase. Calculate the line value of e.m.f. generated. [7M]

(OR)

6. a) Explain the operating principle of a Three phase Synchronous motor. [7M]

   b) Find the synchronous impedance and reactance of an alternator in which a given field current produces an armature current of 200 A on short-circuit and a generated e.m.f. of 50 V on open-circuit. The armature resistance is 0.1 ohm. To what induced voltage must the alternator be excited if it is to deliver a load of 100 A at a p.f. of 0.8 lagging, with a terminal voltage of 200V. [8M]

UNIT-IV

7. a) Explain how the rotating magnetic field is created in a three-phase induction motor. [8M]
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b) A 6-pole, 50-Hz squirrel-cage induction motor runs on load at a shaft speed of 970 r.p.m. Calculate: - [7M]
(i) The percentage slip (ii) the frequency of induced current in the rotor.

(OR)

8. a) Draw and explain the equivalent circuit of a Three phase induction motor. [8M]

b) The power input to a 500 V, 50 Hz, 6 pole, 3-phase induction motor running at 975 rpm is 40 kW. The stator losses are 1 kW and the friction wind-age losses are 2 kW. Determine (i) the slip (ii) the rotor copper loss (iii) the brake horsepower (iv) the efficiency. [7M]

UNIT-V

9. a) How do you make the Single – phase induction motor self-starting? [7M]

b) Explain the working of Shaded – pole single phase motor with a neat diagram. [8M]

(OR)

10. a) Explain with a neat diagram the working of a capacitor – start induction run motors. [8M]

b) How can we reverse the direction of rotation of repulsion, repulsion induction and repulsion-induction and repulsion- start-induction-run motors? [7M]

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