

Roll No. ....

340  
Total Pages : 3

80745

B.Tech. (EL), IV Semester

ELECTRICAL MACHINES-II (EE 208 C)

Time : 3 Hours]

[Max. Marks : 75

**Instructions :**

- (i) It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
- (ii) Answer any four questions from Part-B in detail.
- (iii) Different sub-parts of a question are to be attempted adjacent to each other.

**PART-A**

1. (a) What are the advantages of having rotating field system rather than a rotating armature system in a synchronous machine? (1.5)
- (b) What is meant by voltage regulation of an alternator? (1.5)
- (c) What do you mean by pull out torque of an induction motor? (1.5)
- (d) Why induction generator is generally not used for power production? (1.5)
- (e) Write various applications of synchronous generator. (1.5)
- (f) Why the reactance of the rotor of induction motor varies greatly between starting and running conditions? (1.5)

80745/80/111/227

[P.T.O.]

- (g) Why induction motor cannot run at synchronous speed? (1.5)
- (h) What are the conditions for parallel operation of synchronous generators? (1.5)
- (i) Why power factor is changed when induction motor is loaded? (1.5)
- (j) Why the slip 's' is taken between 0.1 and 0.2 in voltage control of loaded induction motor? (1.5)

### PART-B

2. (a) Draw equivalent circuit of self-excited induction generator. Explain its working principle with labelled phasor diagram. (7)
- (b) A three-phase 4 pole 50 Hz induction motor while working at rated voltage and frequency has a starting torque of 160% and a maximum torque of 200% of the full-load torque. Determine : (i) the full load speed and (ii) the speed at maximum torque. (8)
3. (a) Explain two reaction theory of synchronous machines. (8)
- (b) Discuss the concept of replacing the armature reaction by a reactance. What is the necessity of making this simplification? (7)
4. (a) What do you mean by V curves in synchronous machines? How these are determined experimentally? (5)
- (b) A three phase, 2.3 kV, 50 Hz, star connected synchronous motor has synchronous reactance of 10 ohm per phase and negligible resistance. When the motor delivers

200 HP, the power factor angle is  $10^\circ$  and the efficiency is 85% excluding the field losses. Calculate :

- (i) Excitation voltage per phase (ii) armature current and (iii) the power factor. (10)
5. (a) Draw phasor diagram of three-phase induction motor under blocked rotor condition. (7)
- (b) Plot torque speed characteristics of three-phase induction motor by showing each segment of characteristics. Develop torque equation for it. (8)
6. (a) What do you mean by synchronous impedance? How it is determined experimentally? (7)
- (b) The armature of a three-phase 800 kVA, 11 kV, star connected alternator has resistance of 1 ohm per phase and synchronous reactance of 20 ohm per phase. Determine the percentage voltage regulation for a load of 600 kW at a power factor of 0.8 pf leading. (8)
7. (a) Draw labelled phasor diagram of an alternator at unity, lagging and leading power factors. (7)
- (b) Explain the constructional details of a synchronous machine, giving reason for making two different type of rotors. (8)