Registration No :

Total Number of Pages : 02

Course: **B.Tech**
Sub_Code: **PEE4I101/ PEL4I101**

4th Semester Back Examination: 2022-23
SUBJECT: ELECTRICAL MACHINES - II
BRANCH(S): ELECTRICAL, EEE
Time: 3 Hour
Max Marks: 100
Q. Code: M349

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) An 8 pole wave connected armature has 300 conductors and runs at 800 rpm. Determine the useful flux / pole if the electromotive force generated on open circuit is 500 V.

b) How does field distortion affect commutation?

c) Mention the causes for failure of voltage buildup in case of a DC shunt generator.

d) What would happen if the armature of a dc motor is switched on to power supply, while the field circuit is open?

e) What type of rotor is adopted for high speed alternators and why?

f) What do you mean by armature reaction of a three phase alternator?

g) An 8-pole synchronous generator is running at 750 rpm. What is the frequency? At what speed must the generator be run so that frequency shall be 25 Hz?

h) Mention the need for starters in synchronous motors.

i) Draw the V-curve and inverted V-curve at different loading conditions.

j) What are the applications of synchronous condenser?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Explain with relevant diagrams, the different methods of excitation of DC machines.

b) In a DC compound generator the armature, shunt-field winding and series field winding resistances are given by 0.6 ohm, 150 ohms and 0.3 ohms respectively. The machine is connected to a load of 15 kW, 200 V. Find the i) EMF generated ii) armature current and iii) power generated by armature when the machine is connected in Long shunt mode.

c) A 25 kW, 250 V, DC shunt generator has armature and field resistances of 0.06 ohm and 100 ohm respectively. Determine the total armature power developed when working (i) as a generator delivering 25 kW output and (ii) as a motor taking 25 kW input.

d) Describe with a neat connection diagram, the working of a three point starter used for a DC Shunt motor.

e) Why do DC series motors never start on no-load? Draw and explain the various characteristics of DC series motor.

f) Derive the relation between electrical and mechanical angle in case of rotating machine.

g) What do you mean by OCC and SCC of an alternator? Find the OCC and SCC with the required circuit diagram.

h) A three phase star connected, round-rotor synchronous generator rated at 10 kVA, 230 V has a synchronous reactance of 1.2 Ω per phase and armature resistance of 0.5 Ω per phase. Calculate the percentage voltage regulation at full load with (i) 0.8 lagging power factor, and (ii) 0.8 leading power factor.

i) A 20 kVA, 220 V, star connected, three phase, and salient-pole synchronous generator supplies rated load at 0.707 lagging power factor. The reactances per phase are $X_d = 2X_q = 4\Omega$. Neglecting the armature resistance, determine (a) the power angle and (b) the percent voltage regulation.

j) Write down the mode of operation of synchronous motor during normal, under and over excitation.

k) A 3 phase, 2.3 kV, star connected synchronous motor draws a current of 200 A from the supply while driving a certain load. The stator has armature resistance of 0.2 Ω per phase and a synchronous reactance of 2.2 Ω per phase. The motor is operating at 0.5 power factor leading. Determine the generated EMF per phase.

l) Explain the construction and operation of AC series motor?

Part-III
Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain the constructional features and principle of operation of DG generator. **(16)**

Q4 Derive the torque equation of a DC motor. Also explain the characteristics of DC shunt motor with relevant diagram. **(16)**

Q5 What are the different conditions to be satisfied for parallel operation of alternators? Describe in detail the full process of synchronization of three phase alternator using dark lamp method. **(16)**

Q6 What do you mean by hunting of a synchronous motor? What are causes & effect of hunting? How do you overcome hunting? **(16)**