VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Even Mid Semester Examination for Academic Session 2024-25

COURSE NAME: B.TECH SEMESTER: 4th

BRANCH NAME: ELECTRICAL ENGINEERING & EEE

SUBJECT NAME: ELECTRICAL MACHINE-II

FULL MARKS: **30** TIME: **90 Minutes**

Answer **All** Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer *all* Questions. **[2 × 3]**

a) What are the principal advantages of rotating field system type of construction of synchronous machines? - CO1

b) Why terminal voltage of a synchronous generator is greater than the internal induced EMF in case of capacitive load? - CO2

c) What is Blondel's two reaction theory? - CO3

Q2. **[8]**

A three phase, 16-pole alternator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03Wb, sinusoidally distributed and the speed is 375r.p.m. Find the frequency and the phase and line EMF. Assume the coil span as 150^0. - CO1

OR

A 500 kVA, 1,100 V, 50 Hz star connected 3-phase alternator has armature resistance per phase of 0.1 Ω and synchronous reactance per phase of 1.5 Ω. Find its voltage for (i) 0.9 pf lag and (ii) 0.8 pf lead. Also find the voltage regulation in each case and draw phasor diagram. - CO1

Q3. **[8]**

Derive the equation for power developed in a salient pole alternator. Draw the relevant diagram. - CO2

OR

A 3-phase, Y-connected syn. generator supplies current of 10 A having phase angle of 20° lagging at phase voltage of 400 V. Find the load angle and the components of armature current Id and Iq if Xsd = 10 ohm and Xsq = 6.5 ohm. Assume that Ra to be negligible. Also, calculate voltage regulation. - CO2

Q4. **[8]**

Define synchronizing power? What is synchronizing power and synchronizing Torque Coefficient? - CO3

OR

(a) What are the conditions required for the parallel operation of alternator? What are the advantages of parallel operation of two alternators? - CO3

(b) Explain "Two bright and One dark lamp" method of synchronization of three phase alternator with infinite bus-bar.