CODE NO OR 310205 OR

# 2005 JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY

III B.TECH I SEMESTER SUPPLYMENTARY EXAMINATIONS

ELECTRO MECHANICS-II

(ELECTRICAL AND ELECTRONICS ENGINEERING)

NOVEMBER 2005

TIME: 3 HOUR
MARK: 80

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**ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS**

**MARK [ 5*16=80 ]**

1. (a) Explain the essential difference between cylindrical and salient pole rotors used in large alternators.

(b) A certain alternator has 6 slots per pole and the coils are short pitched by 1slot. The coil span is 5 slot pitches. Calculate the pitch factor.

2. (a) Discuss how synchronous impedance of alternator can be determined

(b) A 4-pole, 3-phase, 50Hz,star-connected alternator has 60 slots, with 2 conductors per slot and having armature winding of the two-layer type. Coils are short-pitched in such a way that if one coil side lies in slot number 1,the other lies in slot number 13.Determine the useful flux per pole required to generate a line voltage of 6000V.

3. (a) What is voltage regulation? Discuss the synchronous impedance method of calculating voltage regulation.

(b) A 500V, 50KVA, 1-phase alternator has an effective resistance of 0.2 .A field current of 10A produces an armature current of 200A on short circuit and an emf of 450V on open circuit. Calculate

i. Synchronous impedance and reactance

ii. Full-load regulation with 0.8p.f. lagging.

4. (a) Explain how regulation is determined from slip test

(b) A 3-phase salient -pole synchronous generator has Xd=0.8 p.u.; Xq =0.5 p.u. and Ra =0.generator supplies full -load at 0.8 p.f. Lagging at rated terminal voltage. Compute

i. power angle and

ii. no-load voltage if excitation remains constant.

5. (a) Explain the procedure to determine the following

i. Sub transient reactance

ii. Transient reactance

iii. Steady state reactance

(b) The speed regulation of two 500 KW alternators A and B running in parallel are 100% to 104% and 100% to 105% from full load to no load respectively. How will the two alternators share a load of 800KW and also find the load at which one machine ceases to supply any portion of the load?

6. (a) What are the advantages and disadvantages of the synchronous motor?

(b) A Synchronous motor takes 25KWfrom 400V supply mains. The synchronous

reactance of the motor is 4 . Find the power factor at which the motor would operate when the exciting current is so adjusted that the generated emf is 500V.

7. (a) What is the effect on synchronous motor when the load is changed.

(b) A 3300V, star connected synchronous motor is operating at constant terminal voltage and constant excitation. Its synchronous impedance is (0.8+j5) . It operates at a p.f of 0.8 leading when drawing 800KW from the mains. Find its power factor when the input is increased to 1200KW, excitation remaining constant.

8. (a) Describe the constructional feature and principle of operation of a shaded pole motor.

(b) Explain what is meant by the split-phase method of motor starting. [8+8]