ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION : MAY 2021** (Academic Session: 2020 – 21)		
Name of the Program:	B. Tech.	**Semester:**	IV
Paper Title :	Electrical Machines – II	**Paper Code:**	EEE42102
Maximum Marks :	**40**	**Time duration:**	2 Hours
Total No of questions:	8	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	Read complete question paper before starting the examination.		

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. a) The torque-slip characteristic of an induction motor is approximately a/an
(i) straight line (ii) rectangular hyperbola (iii) parabola (iv) hyperbola.

b) An increase in rotor circuit reactance of a 3-phase induction motor will
(i) reduce starting torque as well as maximum torque
(ii) increase starting torque as well as maximum torque
(iii) increase starting torque and reduce maximum torque
(iv) increase maximum torque and reduce starting torque.

c) In an induction motor if the flux density is reduced to one-half of its normal value then the torque will
(i) reduce to one-half (ii) reduced to one-fourth
(iii) remain unchanged (iv) increase four times.

d) Stable operation of an induction motor is:
(i) between zero slip and unity slip (ii) between 0.5 slip and 0.95 slip
(iii) between zero slip and slip corresponding to maximum torque
(iv) between slip corresponding to maximum torque and unity slip.

e) In a three-phase induction motor iron loss mainly occurs in
(i) stator and rotor (ii) rotor core and rotor teeth
(iii) stator core and stator teeth (iv) stator winding.

GROUP –B

Answer *any three* of the following $3 \times 5 = 15$

2. State the merits of using synchronous motor.

3. Explain why a synchronous motor will run at synchronous speed or not at all. How can the speed of such motor can be varied?

4. A 6-pole, 50 Hz, 3-phase slip-ring induction motor has resistance and reactance of 0.5 Ω and 5 Ω per phase respectively. Calculate (i) at what speed the torque is maximum? (ii) the ratio of maximum torque to starting torque, (iii) what must be the external resistance per phase have so that the starting torque is half of the maximum torque.

5. The power input to the rotor of a 440 V, 50 Hz, 3-phase, 6-pole induction motor is 60 kW. It is observed that the rotor emf makes 90 complete cycles per minute. Calculate (i) the slip, (ii) the rotor speed, and (iii) rotor copper loss.

GROUP –C

Answer *any two* of the following $2 \times 10 = 20$

6. A three-phase start-connected synchronous motor has a synchronous reactance of 4 Ω per phase and is working on 1100 V bus-bar. Calculate the power factor of this machine when taking 90 kW from the mains, the excitation being adjusted to a value corresponding to an induced emf of 1200 V. Neglect armature resistance.

7. A 110 V, 3-phase, start-connected induction motor takes 25 A at a line voltage of 30 V with rotor locked. With this line voltage, power input to the motor is 440 W and core loss is 40 W. The dc resistance between a pair of stator terminals is 0.1 Ω. If the ratio of ac to dc resistance is 1.6, find the equivalent leakage reactance per phase of the motor and the stator and rotor resistance per phase.

8. A 25 HP, 6-pole, 50 Hz, 3-phase induction motor has stator to rotor phase voltage ratio of 6/5. The stator and rotor impedances per phase are (0.25 + j0.75) ohms and (0.173 + j0.52) ohms respectively. Find the starting torque exerted by the motor when an external resistance of 1 ohm is inserted in each phase, the motor being started directly on the 400 V supply system. Assume start-start connection.

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