PAPER ID-310575

Subject Code: REE501

Roll No: | | | | | | | | | | | | | |

B. TECH
(SEM-V) THEORY EXAMINATION 2020-21
ELECTRICAL MACHINES-II

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Justify the reason of connecting armature winding of 3 phase alternator in star.
b.	Summarize the conditions to be fulfilled for parallel operation of two alternators.
c.	Draw and explain V-curves for Synchronous motor.
d.	Why Rotor core-losses are negligible in induction motor?
e.	Illustrate the need of starter for starting the induction motors.
f.	Evaluate the effect of rotor resistance on Torque-Slip characteristics.
g.	Explain equivalent circuit of single-phase Induction motor.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	Evaluate armature reaction for purely resistive, inductive and capacitive load conditions. Explain with the help of suitable diagrams.
b.	Why the synchronous motor does not have a starting torque? Explain briefly. Describe the working principle and methods of starting a synchronous motor.
c.	Establish the torque equation of three phase Induction motor. Also find starting and maximum torque of the machine.
d.	Name the various method of starting the poly-phase induction motors and evaluate the star-delta method of starting in details.
e.	Evaluate the "Double field revolving theory" and show that a single-phase induction motor is not self-starting. Draw the torque–slip curve based on this theory.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Justify the terms synchronous impedance and voltage regulation of an alternator. Examine the synchronous impedance method of determining voltage regulation of an alternator.
(b)	Illustrate, with neat sketches, the constructional difference between cylindrical and salient pole rotors used in large alternators and explain armature reaction at (i) unity power factor (ii) zero leading power factor (iii) zero lagging power factor. Draw the relevant phasor diagrams.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Summarize the Blondel's two reaction theory for Salient pole synchronous machine.
(b)	Determine the expression for power developed by 3-phase alternator having (i) salient pole (ii) smooth cylindrical rotor.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Develop an equivalent circuit of three induction motor and describe in detail.
(b)	A 37.3kW, 4pole, 50Hz induction motor has friction and windage losses of 3320 watts. The stator losses equal the rotor losses. If the motor is delivering full load power output at a speed of 1440 rpm, calculate, (i). Synchronous speed, (ii). Slip (iii). Mechanical power developed by the motor, (iv). Rotor copper loss, (v). Power transferred from stator to rotor, (vi) Stator power input, (vii). Efficiency.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	How is it possible to obtain a high starting torque and good running performance with a double cage induction motor? Compare a double cage induction motor with a deep bar induction motor.
(b)	Analyze the phenomenon of cogging and crawling in a three-phase induction motor.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Compare the working principle of (i) split phase (ii) capacitor start (iii) capacitor start and capacitor run single phase induction motor with the help of neat sketches.
(b)	A 220 V, 1 phase induction motor give the following test results: Blocked rotor test: 120 V 9.6 A 460W No load test : 220V 4.6 A 125 W The stator winding resistance is 1.5 Ω and during blocked rotor test, the starting winding is open. Determine equivalent circuit parameters.