Shirpur Education Society's

R. C. PATEL INSTITUTE OF TECHNOLOGY, SHIRPUR

An Autonomous Institute

(Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere)

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(स्वायत्त महाविद्यालय)

Academic Year (2022-23)

Year: 3 Semester: V

Program: B. Tech. (ELECTRICAL ENGG.) **Max. Marks: 75**

Subject: Electrical Machine-II (PCEE5010T) **Time: 10:30 am to 1:30 pm**

Date:10/01/02022 **Duration: 3 Hours**

END SEM EXAMINATION –ODD SEM-V (Regular)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

(1) This question paper contains 2 pages.

(2) All Questions are Compulsory.

(3) All questions carry equal marks.

(4) Answer to each new question is to be started on a fresh page.

(5) Figures in the brackets on the right indicate full marks.

(6) Assume suitable data wherever required, but justify it.

(7) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Compare salient pole & non salient type of alternators. **OR** Derive the expression for emf induced in case of a 3 phase alternator.	[05] [05]
Q1 (b)	An alternator runs at 250 r.p.m. and generates an e.m.f. at 50 Hz. There are 216 slots each containing 5 conductors. The winding is distributed and full pitch. All the conductors of each phase are in series and flux per pole is 30 mWb which is sinusoidally distributed. If the winding is star connected, determine the value of induced e.m.f. available across the terminals.	[10]
Q2 (a)	i. Compare - Direct method, emf method, MMF method of Finding regulation of alternator. ii. Define voltage regulation of alternator. Explain why Potier method gives more accurate results than synchronous impedance method **OR** A 1000kVA, 6.6kV,3-phase star connected alternator has a synchronous reactance of 25 Ω/ph with negligible resistance. It supplies full load current of 0.8 p.f. lagging and at rated terminal voltage. Compose the terminal voltage for the same excitation when the generator supplies full load current at 0.8 p.f. leading.	[06] [04] [10]
Q2 (b)	Discuss the synchronous impedance method of calculating regulation of an alternator.	[05]
Q3 (a)	Describe any two methods of making the synchronous motor self-start. **OR** What is synchronous condenser? State its advantages and disadvantages.	[05] [05]

Q3 (b)	Explain operation of synchronize motor at 1) Constant load & variable excitation 2) Constant excitation & variable load. **OR** Estimate the line value of emf induced and the voltage regulation, when 3-phase, star connected alternator supplied a load of 1000kW at a power factor of 0.8 lagging with a terminal voltage of 11kV. Its armature resistance is 0.4Ω per phase and synchronous reactance is 3Ω per phase.	[10] [10]
Q4 (a)	How a rotating magnetic field is created in a 3 phase induction motor? **OR** i. Illustrate with neat diagrams the working principle of 3 phase induction motor. ii. Compare Squirrel Cage IM & Slip ring IM	[08] [04] [04]
Q4 (b)	Draw the equivalent circuit of 3 phase induction motor and state the relevance of each parameter. Write the equation for the mechanical power developed.	[07]
Q5 (a)	**Solve any two.** i. Explain Hysteresis motor with its application ii. With a neat diagram explain construction and working of linear induction Motor. State its applications. iii. Explain the working principle and applications of single phase shaded pole motors. iv. Explain the cross field theory as applied to a single phase induction motor.	 [05] [05] [05] [05]
Q5 (b)	Draw the equivalent circuit of a single phase induction motor and discuss the experimental procedure to obtain its parameters.	[05]