



JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), April-May 2015

B. Tech in Electrical..... Engineering, Semester 4th...

Roll No.....

COURSE CODE:EE 401 - Electrical Machines-II

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	An induction motor and a synchronous motor are connected to a common feeder line. To operate the feeder at unity p.f. the synchronous motor should be (a) under excited (b) over excited (c) normally excited (d) disconnected from the common terminal	
ii.	In an induction motor if the air gap is increased (a) its speed will reduce (b) it's efficiency will improve (c) it's power factor will reduce (d) it's break down torque will reduce	
iii.	The rotor slots are slightly skewed in squirrel-cage induction motor to (a) increase the strength of rotor bars (b) reduce the magnetic hum and locking tendency of rotor (c) economise the on the copper to be used (d) provide ease of fabrication	
iv.	In a 3Φ induction motor, the resultant flux is of constant nature and is (a) equal to Φ_m , where Φ_m is maximum flux due to any phase. (b) 1.5 times maximum value of flux due to any phase (c) $\sqrt{3}/2$ times maximum value of flux due to any phase (d) $3 \Phi_m$	
v.	The leakage reactance of a three-phase alternator is determined by performing (a) open-circuit and zero power factor test (b) zero power factor and slip tests (c) open circuit and short circuit tests (d) short-circuit and slip tests	
vi.	Power factor of an alternator driven by constant prime mover input can be changed by changing its (a) speed (b) load (c) field excitation	



	(d) phase sequence	
vii.	Which one of the following is the primary reason for placing field on rotor in an alternator? (a) small power in the field circuit (b) Insulation of high voltage is made easy on stator than on rotor. (c) large power in stator (d) large current in stator	
viii.	Which type of alternator is used in hydroelectric power stations? (a) non salient pole alternator (b) turbo generator (c) salient pole alternator (d) steam turbine	
ix.	Distributed winding and short chording employed in ac machines will result in (a) increase in emf and reduction in harmonics. (b) reduction in emf and increase in harmonics. (c) increase in both emf and harmonics. (d) reduction in both emf and harmonics.	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	What is Crawling?	
ii.	A slip ring induction motor runs at full load, when connected to 50Hz supply. Determine the number of poles and slip.	
iii.	Calculate the distribution factor for a 36-slots, 4-pole, single layer three-phase winding.	
iv.	What is Hunting?	

Q.3A	Calculate a rms value of induced emf per phase of a 10 pole 3- Φ , 50 Hz, alternator with 2 slots per pole/phase and 4 conductors per slots in two layers. The coil span is 150° . The fundamental component of flux per pole is 0.12wb and 20% 3 rd component.	05
Q.3B	What are the different torques of a synchronous motor?	05
Q.4A	In a noload test an induction motor took 10 A and 450 watt with a line voltage of 110 V. if the stator resistance per phase is 0.05Ω and friction and windage loss amount is 135 watt. Calculate exciting conductance and susceptapnce per phase.	05
Q.4B	Describe the torque slip characteristics of three phase induction motor.	05
Q.5A	The power input to a 500 V, 50Hz, 6 pole 3- Φ induction motor running at 975 rpm is 40kw. The stator losses are 1kw and the friction & windage losses are total 2kw. Find (i) the slip (ii) the rotor cu. Loss (iii) shaft power (iv) the efficiency	05
Q.5B	Derive the effect of harmonics on induced emf of three phase induction motor.	05
Q.6A	Derive the gross mechanical power developed by synchronous motor.	05



Q.6B	Write a short note on construction of V-curves. OR	05
Q.6B	Describe the effects of harmonics on induced e.m.f of alternator.	05
Q.7A	Write a short note on A.C series motor	05
Q.7B	Describe the torque-slip characteristics of 3- Φ induction motor. OR	05
Q.7B	Give a comparison between synchronous motor and induction motor.	05
Q.8A	A 1100 V, 50Hz delta connected induction motor has a star connected slip-ring rotor with a phase transformation ratio of 0.263. The rotor resistance and stand still leakage reactance are 0.012Ω and 0.25Ω per phase respectively. Neglecting stator impedance and magnetizing current determine. (i) the rotor current at start with slip-rings shorted (ii) the rotor power factor at start with slip-rings shorted (iii) the rotor current at 4% slip with slip-rings shorted (iv) the rotor power factor at 4% slip with slip-rings shorted (v) the external rotor resistance per phase required to obtain a starting current of 100A in the stator supply lines.	10
Q.9A	In a 50-KVA, star-connected, 440-V, 3-phase, 50Hz alternator, the effective armature resistance is 0.25Ω per phase. The synchronous reactance is 3.2Ω per phase and leakage reactance is 0.5Ω per phase. Determine at rated load and unity power factor (i) Internal e.m.f E_a (ii) no-load e.m.f E_0 (iii) percentage regulation on full-load (iv) value of synchronous reactance which replaces armature reaction	10
Q.9B	A certain 3-Φ star connected 100 KVA, 11 KV alternator has rated current of 52.5A. The A.C. resistance of the winding per phase is 0.45Ω. The test results are given below. O.C. test : field current = 12.5 A, line voltage = 422 V S.C. test : field current = 12.5 A, line current = 52.5 A Determine the full load voltage regulation of the alternator at 0.8 p.f. leading. OR	10
Q.9B	A 3Φ induction motor has a 4 pole star-connected stator winding and runs on a 220 V, 50 Hz supply. The rotor resistance per phase is 0.1Ω and reactance is 0.9Ω. The stator to rotor turns ratio is 1.75. The full load speed is 5%. Find for this load- (i) the load torque in kg-m (ii) speed at maximum torque (iii) the rotor e.m.f. at a maximum torque	10

Best of luck

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