Reg. No.



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IV SEMESTER B.TECH. (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL - MAY 2017

ELECTRICAL MACHINERY II [ELE 2202]

REVISED CREDIT SYSTEM

Time:	3 Hours	Date: 24 th April 2017	Max. Marks: 50
Instructions to Candidates:			
	✤ Answer ALL the questions.		
	 Missing data may be suitably as 	ssumed.	
	 ✤ Graph sheets shall be supplied, 	if required.	
1A.	Mention the protection scheme functions.	s employed in a three-point starter and dis	cuss their (03)
1B.	A 50 kW, 400 V DC shunt motor The flux per pole is 40 mWb interpole windings have total re Calculate full load speed, armate	r has 4 poles and wave winding with 500 co . Its full load efficiency is 91%. The arm esistance of 0.2 Ω . The shunt field resistance ure torque and useful torque.	onductors. ature and e is 200 Ω. (04)
1C.	Two DC motors, each giving a f 90%. When running light, losse W. Find the half load efficiency of	full load output of 15 kW, have full load effected of the soft of motor A are 600 W and that of motor of each motor.	iciency of B are 700 <i>(03)</i>
2A.	A 220 V, 8 hp DC series motor runs at 400 rpm with no exter required by the fan is proportio Ω . Neglect armature reaction an	is mechanically coupled to a fan and draws ernal resistance connected to armature. The onal to square of the speed. $R_a = 0.8 \Omega$ and and rotational losses.	30 A and he torque R _{field} = 0.6
	(a) Determine the power delive(b) If the speed is to be reduced circuit, determine its value and	red to the fan and torque developed by the r to 300 rpm by inserting a resistance in the the power delivered to the fan.	notor. armature (04)
2B.	What is hunting phenomenon Amortisseur windings.	in a synchronous motor? Explain the fu	nctions of (03)
2C.	Using relevant phasor diagra synchronous motor supplying a conditions.	am, discuss the behaviour of a cylindric constant load but operating under varying	cal rotor excitation (03)
3A.	Two station alternators A & B o MW and 25 MW. The no-load f characteristics are 0.06 Hz/MW (a) The common operating freq	operate in parallel. Respective rated capacit frequency of both generators is 50 Hz. The and 0.07 Hz/MW respectively. Calculate: uency & load sharing for a connected load o	ies are 50 drooping f 50 MW.
3B.	(b) Maximum power shared by Along with necessary waveform	both machines without overloading either c ns, discuss the behaviour of a three-phase	f them. (04) alternator
30	subjected to a symmetrical 3-ph	hase short circuit.	(03)
50	Draw the connection diagram o	i sup test and brieny explain its significance	(03)

- **4A.** A three-phase, 20 MVA, 11 kV, 50 Hz star-connected alternator has $X_d = 4 \Omega$ and $X_q = 3 \Omega$. Armature resistance is negligibly small. At full load, 0.8 lagging power factor, determine:
 - a) Direct and quadrature axes components of the armature current.
 - b) Excitation emf.
 - c) Voltage regulation.
 - d) Electromagnetic power.
 - e) Reluctance power.

(07)

(03)

- **4B.** A three-phase, 50 Hz, 1,000 rpm alternator has 108 slots. The armature is lap connected with a coil span of 160°. Calculate pitch & distribution factors for fundamental, 5th harmonic & 7th harmonic.
- 5A. An industrial plant is supplied with 875 kVA of electrical power at 0.8 pf lagging from a three-phase, 50 Hz, 11 kV substation. A synchronous motor of rating 100 kVA operating at a leading power factor of 0.6 is added during the expansion. Calculate the new kVA supplied by the substation and the overall power factor of the plant. (03)
- **5B.** With the help of suitable schematic, explain the operation of a BLDC motor.
- **5C.** A three-phase, 11 kV, 800 kW, 6 pole, 50 Hz star connected synchronous motor has synchronous reactance of 4 Ω / phase. It operates at 0.6 lagging power factor. Neglecting all losses, find synchronising power and torque developed per mechanical degree of displacement.

(04)

(03)