PVP 20

Code:20EE3402

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2023

ELECTRICAL MACHINES - II
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Show the Torque-Slip characteristics of Three phase induction motor for different rotor resistances.	L3	CO2	7 M
	b)	Deduce an expressions for rotor current, rotor emf and p.f of a 3-phase induction motor at standstill and running conditions.	L4	CO4	7 M
		OR			
2	a)	With the help of neat diagram explain the constructional features of wound rotor type of induction motor. Write advantages and disadvantages of wound rotor type of induction motor.	L3	CO2	7 M
	b)	A 3-phase induction motor has a 4 pole, star connected stator winding and runs at 220V, 50 Hz supply. The rotor resistance per phase is 0.1Ω and reactance per phase is 0.9Ω. The ratio of stator to rotor turns is 1.75. The full	L4	CO4	7 M

		load slip is 5% calculate (i) load torque in Kg-m (ii) speed at maximum torque and (iii) rotor emf at maximum torque.			
		UNIT-II			
3	a)	The following test data were obtained on a 460 V, 60 Hz, delta connected, three phase induction motor: No load test: Power input=380 W, line current=1.15 A at rated voltage. Blocked rotor test: power input=14.7 W, line current=2.1 A at the line voltage of 21 V. The friction and windage loss is 21 W, and the winding resistance between any two lines is 1.2 ohm. Determine the equivalent circuit parameters of the motor.	L4	CO4	7 M
	b)	Illustrate the step-by-step procedure for obtaining the Circle diagram of three phase induction motor.	L3	CO2	7 M
		OR			
4	a)	A 4-pole, 50 Hz, 3-phase induction motor develops a maximum torque of 110 N-m at 1360 rpm. The resistance of the star-connected rotor is 0.25Ω/phase. Calculate the value of resistance that must be inserted in series with each rotor phase to produce a starting torque equal to half of the maximum torque.	L4	CO4	7 M
	b)	Why starters are necessary for starting an induction motor? Illustrate the various types of starters used for Induction motor starting?	L3	CO2	7 M

<table>
<tr><td colspan="6">UNIT-III</td></tr>
<tr><td rowspan="2">5</td><td>a)</td><td>Discuss in brief, how voltage regulation can be computed by the synchronous impedance method with neat sketch.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>A 3 phase 8 pole star connected alternator has the armature coils short chorded by one slot. The coil span is 165^0 electrical. The alternator is driven at the speed of 750rpm, if there are 12 conductors per slot and flux per pole is 50 mWb. Calculate the value of induced emf across the terminals.</td><td>L4</td><td>CO5</td><td>7 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">6</td><td>a)</td><td>Explain the operation of a synchronous generator with a constant load and variable excitation.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>The following test results are obtained on a 6600V alternator:
<table>
<tr><td>Open circuit voltage</td><td>3100</td><td>5000</td><td>6600</td><td>7500</td><td>8300</td></tr>
<tr><td>Field current(amps)</td><td>16</td><td>25</td><td>37.5</td><td>50</td><td>70</td></tr>
</table>
A field current of 20A is found necessary to circulate full load current on short circuit of the armature. Using ampere-turn method, find the full load regulation at 0.8 pf lagging.</td><td>L4</td><td>CO5</td><td>7 M</td></tr>
<tr><td colspan="6">UNIT-IV</td></tr>
<tr><td rowspan="2">7</td><td>a)</td><td>Illustrate the different types of starting methods of synchronous motor.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>A three phase, 250 hp, 2300 V, 60 Hz, Y connected non-salient rotor synchronous motor has a synchronous reactance of 11 Ω</td><td>L4</td><td>CO5</td><td>7 M</td></tr>
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		per phase. When it draws 165.8 kW, the power angle is 15 electrical degrees. Neglect ohmic losses. Determine (i) The excitation voltage per phase E_F (ii) The supply line current I_a and (iii) The supply power factor.			
OR					
8	a)	Illustrate Why the synchronous machine is not a self-starting machine?	L3	CO3	7 M
	b)	Explain V and inverted V curves of a synchronous machine at various power factors.	L4	CO5	7 M
UNIT-V					
9	a)	Explain with neat sketches the construction and working principle of a Shaded-pole induction motor.	L3	CO3	7 M
	b)	What is double field revolving theory? Explain the equivalent circuit of single-phase induction motor based on double filed revolving theory?	L4	CO5	7 M
OR					
10	a)	Explain the working and constructional details of Single phase induction motor. Draw the circuit diagrams of different types of split phase single phase Induction motor.	L3	CO3	7 M
	b)	Explain the modifications required for a D.C motor to be operated on A.C supply.	L4	CO5	7 M