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Subject Code: BEE-159

B. TECH
Year: 1st Semester: Even
MINOR TEST (EXAMINATION): 2024-25
Basics of Electrical Machines & Protective Equipments

Time: 2 Hr. **Max Marks: 20**

Note: Answer all questions.

			Marks	CO	BL	PO	PI Code
Q1.		Attempt any **Two** parts of the following. **(Unit-1 & Unit-2)**					
	a)	Derive the EMF and Torque equation of DC Machines.	4	1,2	1,2	1	1.3.1
	b)	A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate (i) the synchronous speed (ii) the speed of the motor when slip is 4%.	4	3,4	3,4,5	1,2	1.3.1
	c)	A 50 Hz, 4-pole, 3-phase induction motor has a rotor current of frequency 2 Hz. Determine (1) the slip and (ii) speed of the motor.	4	3,4	3,4,5	1,2	1.3.1
Q2.		Attempt any **Two** parts of the following. **(Unit-1)**					
	a)	Write the concept of Electromechanical energy conversion of DC Machines in detail. Also draw the magnetization and load characteristics of separately excited DC generators.	3	1,2	1, 2	1	1.3.1
	b)	Explain the types of DC Machines with suitable circuit diagram and applications.	3	1,2	1, 2	1	1.3.1
	c)	A DC generator has an armature emf of 100 volt, and useful flux per pole is 20 mWb, and speed is 800 rpm. Calculate the generated emf (i) With the flux and a speed of 1000 rpm. (ii) With the flux per pole of 24 mWb and a speed of 900 rpm.	3	1,2	3,4,5	1,2	1.3.1
Q3.		Attempt any **Two** parts of the following. **(Unit-2)**					
	a)	Explain the principle of operation of three phase induction motor with proper diagram.	3	3,4	1, 2	1	1.3.1
	b)	Explain the principle of operation of single-phase induction motor with proper diagram.	3	3,4	1, 2	1	1.3.1
	c)	A 500 h.p., 3-phase, 440V, 50Hz induction motor has a speed of 950 r.p.m. on full-load. The machine has 6 poles. Calculate the full-load slip. How many cycles will the rotor voltage make per minute?	3	3,4	3,4,5	1,2	1.3.1

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 - Creating)

CO – Course Outcomes

PO – Program Outcomes

PI Code – Performance Indicator Code

Subject Code: BEE-159	Roll No.	2

B. TECH 1st Year

SEMESTER-II, SESSION: 2024-25

MAJOR EXAMINATION

Basics of Electrical Machines & Protective Equipments

Time: 3Hr. **Max. Marks: 50**

Note- Answer all questions.

Q.1	**Attempt any Five parts of the following.** (Unit 1 and 2)	Marks
a)	Draw and discuss different parts of DC Machines with diagrams.	2
b)	Draw and explain the torque–speed characteristics of 3-phase induction motor.	2
c)	Classify DC Machines with suitable connection diagrams. Write torque equation of DC motor	2
d)	A 250 V, 10 kW, separately excited dc generator has an induced e.m.f of 230 V at full load. If the brush drop is 1Volt per brush, calculate the armature resistance of the generator.	2
e)	Discuss working of 1-phase induction motor with suitable circuit diagram.	2
f)	A 500 hp, 3-phase, 440V, 50Hz induction motor has a speed of 960 r.p.m on full-load. The machine has 8 poles. Calculate the full-load slip. How many cycles will the rotor voltage make per minute?	2
g)	Explain the working and construction of 3-phase induction motor.	2
Q.2	**Attempt any Two parts of the following.** (Unit3)	
a)	Explain the operating principle of electromagnetic attraction relays.	5
b)	Explain the construction, working, advantages and disadvantages of gas actuated relay.	5
c)	Explain the operating principle of electromagnetic attraction relays. What is time/TSM curve? How it can be used to obtain the operating time of relay	5
Q.3	**Attempt any Two parts of the following.** (Unit3)	
a)	What is a protective zone? With a simple diagram, show the various zones in a typical power system.	5
b)	Explain the various functions of protective relaying.	5
c)	Explain what is meant by primary protection and backup protection?	5
Q4.	**Attempt any Two parts of the following.** (Unit4)	
a)	Explain with the help of neat sketch the construction and working of minimum oil C.B. What are advantages and disadvantages, compared to bulk oil C.B.?	5
b)	Why SF6 gas is preferred in C.B.? What are advantages and disadvantages of SF6 C.B.?	5
c)	Explain the construction, working, advantages and disadvantages of vacuum C.B	5
Q5.	**Attempt any Two parts of the following.** (Unit4)	
a)	What are the different ratings of C.B.? Explain any one in detail?	5
b)	Explain the construction and working of SF6 C.B.	5
c)	State the requirements of a C.B. and explain the basic action of C.B.	5