SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY

Subject Code: BEE101 **Subject:** Fundamentals of Electrical Engineering

Course: B. Tech. **Semester:** 1st

Sections: A, B & E **Branch:** ALL

SECOND SESSIONAL EXAMINATION, ODD SEMESTER, (2022-2023)

Time – 2 hrs. **Maximum Marks – 45**

SECTION – A

1. Attempt *ALL* questions in brief.

Q N	QUESTION	Marks	CO	BL
a.	What will happen if the primary of a transformer is connected to dc supply?	2	CO3	L1
b.	List the various losses that occur in transformer.	2	CO3	L1
c.	Enlist the various methods of starting of single phase induction motor.	2	CO4	L1
d.	Why Synchronous motor is not self-starting?	2	CO4	L1
e.	Why Earth pin is made thicker and bigger than line and neutral?	2	CO5	L1
f.	What do you mean by battery backup?	2	CO5	L1

SECTION - B

2. Attempt any *ONE* part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Write analogy between magnetic circuit and electric circuit.	5	CO3	L1
b.	A 40 kVA transformer has core loss of 400 W and full load copper loss of 800 W. If the power factor of the load is 0.9 (lagging) then calculate the efficiency of transformer at full load.	5	CO3	L3

3. Attempt any *ONE* part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Derive the expression of torque for dc motor. Also discuss the applications of it.	5	CO4	L6
b.	An 8 pole lap wound dc generator has 450 armature turns. It operates at 0.02 Web flux per pole and runs at 1000 rpm at no load. Find the emf induced by it.	5	CO4	L3

4. Attempt any *ONE* part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Write short notes on characteristics of battery. Calculate the backup of battery of 100 AH connected to load of 100 watts and supply voltage is 12V.	5	CO5	L3
b.	Name the various cables used in electrical system based on insulation. Explain any two.	5	CO5	L2

SECTION - C

5. Attempt any *ONE* part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Discuss the principle of operation of a single phase transformer. Derive EMF equation for a single phase transformer.	6	CO3	L6
b.	What is voltage regulation in a single phase transformer? A 100 kVA, 2,400/240V, 50Hz, single phase transformer has the following parameters- Primary winding (hv side): resistance $R_1 = 2.4\Omega$, leakage reactance $X_1 = 6.0\ \Omega$. Secondary winding (lv side): resistance $R_2 = 0.03\ \Omega$, leakage reactance $X_2 = 0.07\ \Omega$. Find the equivalent resistance & leakage reactance referred to secondary.	6	CO3	L3

6. Attempt any *ONE* part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Derive the relation between frequencies of stator and rotor currents? A 3-phase, 50Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine (i) The speed of rotor with respect to the stator. (ii) The frequency of the rotor current. (iii) The speed of the rotor magnetic field with respect to the stator.	6	CO4	L6
b.	Draw and explain the torque-slip characteristics of three phase induction motor.	6	CO4	L2

7. Attempt any *ONE* part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Write short notes on the following: (i) MCB (ii) ELCB (c) Fuse	6	CO5	L1
b.	An alkaline cell is discharged at a steady current of 4 A for 12 hours, the average terminal voltage being 1.2 V. To restore it to original state of voltage, a steady current of 3 A for 20 hours is required, the average terminal voltage being 1.44 V. Calculate the ampere-hour and watt-hour efficiencies in this particular case.	6	CO5	L3

Bloom's Taxonomy Level (BL) :-

Remember (L1), Understanding (L2), Apply (L3), Analyze (L4), Evaluating (L5), Creating (L6)