B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.   **Semester: III**

Branch: Electrical and Electronics Engineering   **Duration: 3 hrs.**

Course Code: 23EE3PCTDC   **Max Marks: 100**

Course: Transformers and DC Machines

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	*CO*	*PO*	**Marks**
1	a)		Discuss the Principle Of Operation of a transformer.	*CO1*	*PO1*	**06**
	b)		Draw the approximate Equivalent circuit referred to the primary side of a transformer.	*CO1*	*PO2*	**06**
	c)		In a 50 KVA, 11KV/400V transformer, the iron and coper losses are 500W and 600W respectively under rated condition. Calculate the efficiency on unity power factor at full load. Find the load for maximum efficiency.	*CO1*	*PO3*	**08**
			OR			
2	a)		Derive Emf equation of single phase transformer.	*CO1*	*PO2*	**04**
	b)		What are the different Losses occurring in a transformer and derive a condition for its maximum efficiency.	*CO1*	*PO2*	**08**
	c)		Draw the phasor diagram and explain for on-load operation of a given single phase transformer.	*CO3*	*PO3*	**08**
			UNIT - II			
3	a)		What are the necessary conditions to be fulfilled for operating two single phase transformers in parallel operation?	*CO4*	*PO1*	**04**
	b)		Why are tap changing transformers required? Explain the operation of no-load tap changing transformers.	*CO4*	*PO2*	**08**
	c)		Two single phase transformers with equal turns have impedances of (0.5+j3) ohms and (0.6+j10) ohms with respect to secondary. If they operate in parallel, determine how they will share the total load of 100kw at 0.8 pf lagging.	*CO4*	*PO3*	**08**

				CO	PO	
			OR			
4	a)	Explain the working principle and construction of an auto-transformer.		CO4	PO2	**04**
	b)	Write short notes on three phase transformer connections and their corresponding voltage and current relationships.		CO4	PO3	**08**
	c)	Draw the phasor diagram to explain the load sharing between two parallel operating transformers with equal voltage ratio.		CO4	PO4	**08**
			UNIT - III			
5	a)	With the help of a sketch describe the construction of a DC generator.		CO4	PO2	**08**
	b)	Explain the various power stages in a DC generator and derive the Condition of maximum efficiency		CO4	PO3	**06**
	c)	A 4 pole, lap wound, long shunt, dc compound generator has useful flux per pole of 0.07 Wb. The armature consists of 220 turns and resistance per turn is 0.004 ohm. Calculate the terminal voltage if the resistance of shunt and series fields are 100 and 0.02 ohms respectively, when the generator is running at 900 rpm with armature current of 50 Amps. Also calculate the power output in KW for the generator.		CO4	PO4	**06**
			OR			
6	a)	Describe the Generator working principle with the help of a sketch.		CO2	PO2	**06**
	b)	Draw and explain the Characteristics of a DC generator.		CO3	PO3	**08**
	c)	A short compound wound DC generator supplies a load current of 150 Amps at 230V. the generator has the following winding resistances. Armature, Series field, and shunt field winding resistances are 0.15 ohm, 0.1ohm and 100 ohms respectively. Calculate the emf generated if the brush drop is 2V per brush.		CO3	PO4	**06**
			UNIT - IV			
7	a)	What is the Significance of back emf in DC motor and derive an expression for it.		CO3	PO2	**06**
	b)	Explain the working principle of a Three point starter of a DC shunt motor.		CO3	PO3	**08**
	c)	A 10 HP, 230 V shunt motor has an armature resistance of 0.5 ohm and field resistance of 115 ohm. At no load and rated voltage the speed is 1200 rpm and armature current is 2Amp. If load is applied, the speed drops to 1100 rpm. Determine the armature current and the line current.		CO3	PO4	**06**

			OR			
	8	a)	With relevant diagrams describe different methods of speed control of DC Series motor.	CO3	PO4	**08**
		b)	Explain the Necessity of a starter	CO3	PO4	**04**
		c)	A 250V DC shunt motor having an armature resistance of 0.25 ohm carries an armature current of 50 amp and runs at 750 rpm. If the flux is reduced by 10% , find the new speed. Assume that the torque remains the same.	CO3	PO4	**08**
			UNIT - V			
	9	a)	Determine the efficiency of dc series motors by Field test method.	CO5	PO2	**08**
		b)	How the rotational losses are estimated by Retardation test	CO5	PO2	**12**
			OR			
	10	a)	Describe the Hopkinson's test for obtaining the efficiency of 2 similar dc shunt motors.	CO5	PO2	**08**
		b)	Explain the performance of Brake test and determination of efficiency.	CO5	PO2	**12**

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