Name: Enrolment No:	UPES

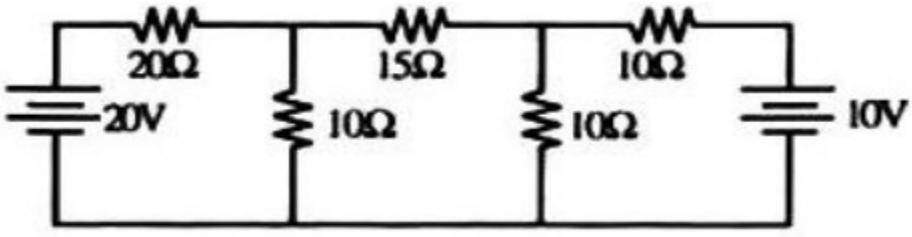
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

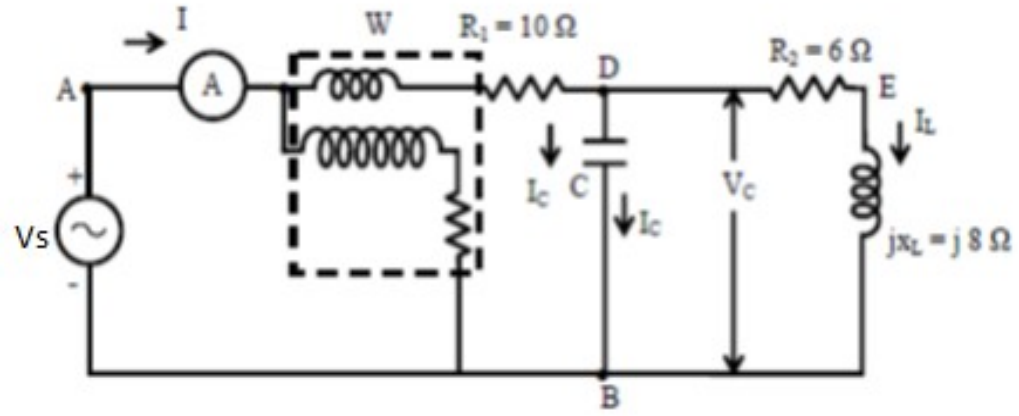
Program Name : B.Tech. [GIE/GSE/ADE/Mechatronics/ASE/ASE-AVI/Electrical/CIVIL/FSE/E&CE]
Semester : I
Time : 03 Hr
Course Name : BASIC ELECTRICAL ENGINEERING
Course Code : EPEG 1001
Max. Marks: 100
Nos. of page(s) : 03
Instructions : Scientific Calculator (Non-Programmable) is allowed

SECTION A

S. No.		Marks	CO
Q 1	Differentiate between the dc generator and the single phase transformer.	4	CO3, CO2
Q 2	Enlist at least one application for the following machine: a) DC Shunt motor b) DC Series motor c) Single phase Induction motor d) Shell type Transformer	4	CO3, CO4
Q 3	Suggest the possible electrical/magnetic parameters against the following UNITs: a) Radian/second b) kW-hr c) Wb/m^2 d) Ampere-Turns	4	CO1
Q 4	Explain the importance of Earthing in domestic places.	4	CO4
Q 5	What does the MCB stands for and how it is better than fuse?	4	CO4

SECTION B

Q 6	Determine the current's in all branches of the network shown in figure. (Using Mesh analysis)  **OR** Explain the types of Batteries & their advantages and discuss about the typical utilization of batteries.	10	CO1, CO2

Q 7	**In a DC Machine, if P=8, Z=400, N=300 rpm and ø=100mWb;** **Calculate the electro motive force induced with winding as:** **a) Lap connected** **b) Wave connected**	**10**	**CO3**
Q 8	**Explain the difference between self-started and separately excited DC generator and draw equivalent circuit diagram for each of them.**	**10**	**CO4**
Q 9	**In the circuit shown below wattmeter reads 960 W and the ammeter reads 6A.** **Calculate the values of Vs, V_c, I_c, I_L and X_c** 	**10**	**CO2**
	SECTION-C		
Q 10	**A)** **A coil having a resistance of 10 ohms and self-inductance of 0.1 H is connected is series with a 150 µ-F capacitor across a 200 V, 50 Hz supply.** **Calculate:** **1) Inductive reactance** **2) Capacitive reactance** **3) Impedance** **4) Power factor** **5) Phase angle between supply voltage and current** **6) Current in the coil** **7) Voltage across capacitor** **8) Voltage across inductor** **9) Power loss across coil** **10) Reactive power in circuit** **11) Apparent power** **12) Power Triangle for the above circuit** **B) State the purpose of the following:** • **Armature winding** • **Field Winding** • **ELCB**	**12 +8**	**CO2, CO4, CO3**

Q10	• **MCCB** **OR** **A) The efficiency of a 200 KVA, single phase transformer is 88.77% when delivering full load at 0.85 power factor and 94.28% at 80% load and unity power factor. (12)** **Calculate:** **1) Core losses** **2) Full load copper losses** **B) Why the no load current in induction motor is more than that of a transformer of similar capacity? How does the speed of the motor affect the magnitude of magnetizing current? (6)** **C) The direction of rotation of the RMF in three phase induction motor is clock wise having phase sequence A-B-C of the applied power supply. For counter clock wise rotation of motor, the phase sequence of the power supply should be (2)** **I. B-C-A** **II. A-C-B (Multiple Choice question)** **III. C-A-B** **IV. B-C-A or C-A-B**	**12+6+ 2**	
Q 11	**A) A 200 kVA single phase transformer has 350 primary turns 1050 secondary turns. The net cross-section area of core is 55 cm^2. If the primary winding be connected to a 400 V, 50 Hz single phase ac supply, calculate:** **1) Voltage induced in the secondary winding** **2) Primary current** **3) Secondary current** **4) Maximum value of flux density in the core** **5) Calculate maximum efficiency at full load condition (iron losses= 2 W & copper losses are 6 W)** **6) Calculate maximum efficiency at 80% load condition (iron losses= 2 W & copper losses are 6 W)** **B) Illustrate the torque speed characteristic for a three-phase induction motor and mark the range of breaking, motoring & generating mode.** **OR** **B) How many types of Cables are used in the power system application? Specify the selection criteria for the cables.**	**12+8**	**CO3, CO4**

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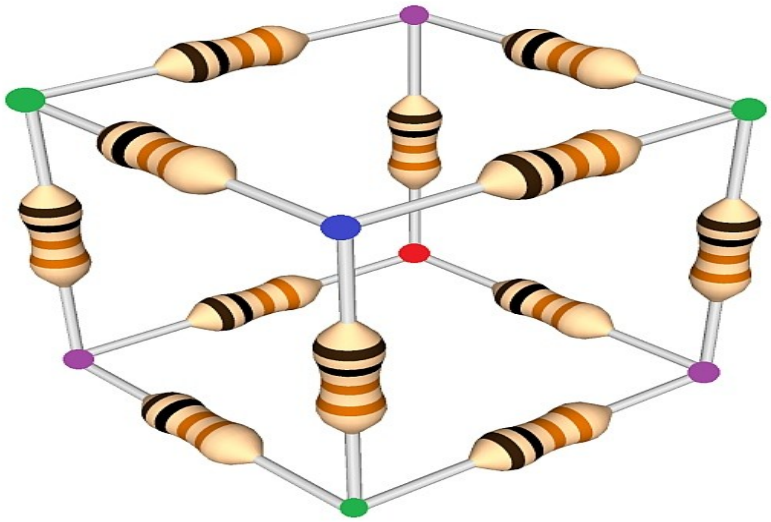
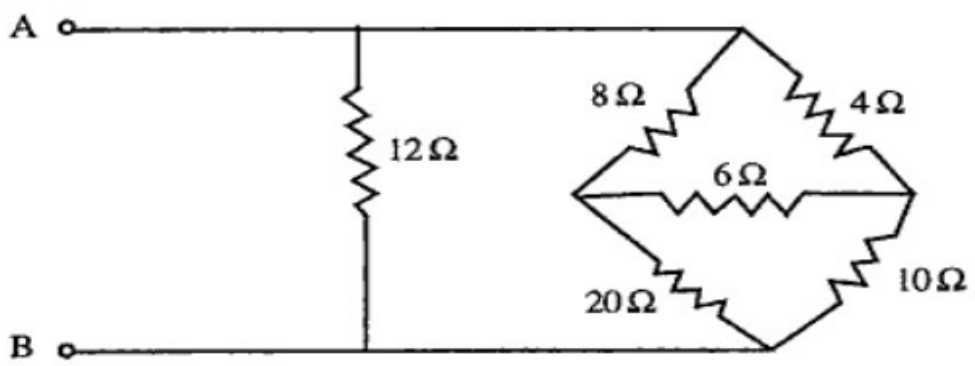
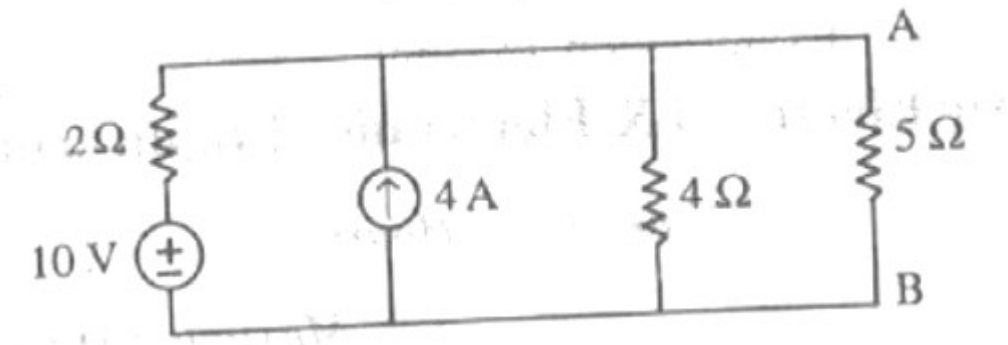
SECTION A

S. No.		Marks	CO
Q 1	Explain the utility of FUSE in domestic loads.	4	CO4
Q 2	Derive the necessary condition for maximum power transfer theorem in a linear dc circuit.	4	CO1
Q 3	Explain the working principle of a single phase transformer with the help of mathematical equations.	4	CO2, CO3
Q 4	Calculate the equivalent resistance across any diagonally opposite points. Assume all the carbon resistors (shown in the diagram) are having equal resistance of 1 Ohm. 	4	CO1
Q 5	Define the Switch-gear and how the energy consumption is calculated in domestic houses and name the device which plays a vital role in energy consumption calculation.	4	CO4

SECTION B

Q 6	Draw the equivalent circuit of a single-phase transformer. Also, indicate the significance of each element in the circuit.	10	CO3

Q 7	**Explain the principle of operation of 3 phase induction motor. Explain the torque-slip characteristics in detail for the same.**	**10**	**CO3, CO4**
Q 8	**a) Find the resistance R_{AB} in the figure using star- delta transformation.**  **(b) What are the disadvantages of poor power factor in ac circuit? How we can improve the power factor for any installation/equipment?**	**5 + 5**	**CO2, CO1**
Q 9	**Find the current in 5-ohm resistor by using Thevenin's Theorem** 	**10**	**CO1**
SECTION-C [There is an internal choice only in Q.10 - part B]			
Q 10	**A) A coil having a resistance of 12 ohms and inductive reactance of 271.43 Ω is connected is series with capacitor having capacitive reactance of 26.52 Ω across a 415 V, 60 Hz supply.** **Figure Out the following:** **1) Self Inductance** **2) Capacitance** **3) Impedance** **4) Power factor** **5) Phase angle between supply voltage and current** **6) Current in coil**	**12 +8**	**CO2, CO3, CO4**

	7) voltage across capacitor **8) voltage across inductor** **9) power loss across coil** **10) reactive power in circuit** **11) Apparant power** **12) Power Triangle for the above circuit** **B) State the purpose of the following:** • **Commutator** • **Reactive Power** • **Tachometer** • **Auto transformer**		
Q 11	**A) Briefly discuss the following battery characteristics that must be taken into consideration while selecting any battery:** **i. Type** **ii. Voltage** **iii. Discharge curve** **iv. Capacity** **v. Energy density** **vi. Specific energy density** **vii. Power density** **viii. Temperature dependence** **ix. Service life** **x. Charge/discharge cycle** **xi. Cost** **xii. Application requirements** **B)** **Explain why the rotor of an induction motor rotates in the same direction as the stator magnetic field and why the speed of the motor is less than the synchronous speed** **OR** **With the help of circuit-connection diagram, describe the method to perform open circuit and short circuit test on single phase transformer. Do not forget to mention the appropriate assumptions.**	**12+8**	**CO4, CO3**