

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**Online End Semester Examination, Dec 2020**

**Course: Electrical Machines-I**  
**Program: B Tech Electrical**  
**Course Code: EPEG 2010**

**Semester: III**  
**Time : 03 hrs**  
**Max. Marks: 100**

**SECTION A**

- 1. Each Question will carry 5 Marks**  
**2. Instruction: Complete the statement / Select the correct answer(s)**

S. No.	Question	CO
Q 1	Write down 4 applications of Transformers -----, -----, -----, -----	CO 1
Q 2	Write down minimum 3 factors on which the speed of DC motor depends -----, -----, -----	CO 1
Q 3	The purpose of brushes employed in DC machines is -----	CO 1
Q 4	Write down the 2 types of armature reaction happened in DC Machines and its effect. Types: -----, ----- Effect: -----, -----	CO 2
Q 5	Write down the four methods by which flux is varied to control the speed of a DC series motor? -----, -----, -----, -----	CO 2
Q 6	Define Faraday's law of Electro Magnetic Induction.	CO 1

**SECTION B**

- 1. Each question will carry 10 marks**  
**2. Instruction: Write short / brief notes**

Q 7	(a) Derive the EMF equation of a single phase transformer (b) A 200 KVA, 6600 V/400 V, 50 Hz single phase transformer has 80 turns on the secondary. Calculate (i) approximate values of the primary and secondary currents., (ii) the approximate number of primary turns., (iii) the maximum value of field flux	CO 2
Q 8	(a) Explain the importance of Back EMF and how it makes the DC motor a self-regulating machine ? (b) A 500 V shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. the resistance of armature is 0.12 ohms. Calculate the speed when a resistance is inserted in the field, reducing the shunt field to 80% of normal value, and the armature current is 100 A.	CO 3
Q 9	(a) Explain the armature reaction in DC motors	CO 2

	(b) The armature of a 6-pole, 600 rpm lap wound generator has 90 slots. If each coil has 4 turns, calculate the flux per pole required to generate an emf of 288 volts.	
Q 10	Explain the open circuit test and short circuit test with suitable diagram. Also explain what are the parameters going to find through these two tests.	<b>CO 4</b>
Q 11	Explain the following: (i) why are transformers needed in power systems (ii) why is it necessary to provide tappings in the HV winding of a transformer (iii) why the core of a transformer is laminated (iv) why silicon is added to steel and used it for core of a transformer? (v) why the efficiency of a transformer is high?	<b>CO 4</b>
<b>Section C</b>		
<b>1. Each Question carries 20 Marks.</b> <b>2. Instruction: Write long answer.</b> <b>3. Answer any one question</b>		
Q 12	(a) Derive the condition for maximum efficiency in the case of DC Generators. (b) a 4-pole dc shunt generator with a wave wound armature has to supply a load of 500 lamps each of 100 W at 250 V. allowing 10 V for the voltage drop in the connecting loads between the generator and the load, and drop of 1V per brush. Calculate the speed at which the generator should be driven. The flux per pole is 30 mwb and the armature and shunt field resistances are respectively 0.05 ohms and 65 ohms. The number of armature conductors is 390.	<b>CO 3</b>
(OR)		
	(a) Draw and explain the equivalent circuit of single phase transformer referring to primary and secondary (b) a 4000 V/ 400 V, 10 KVA transformer has primary and secondary winding resistance of 13 ohms and 0.15 ohms respectively. The leakage reactance referred to the primary is 45 ohms, the magnetizing reactance referred to the primary is 6000 ohms, and the resistance corresponding to the core loss is 12000 ohms. Determine (i) Total resistance referred to the primary and the values of all the impedances referred to the secondary. (ii) The input current when the secondary terminals are open circuited. (iii) The input current when the secondary load current is 25 ohms at a power factor of 0.8 lagging.	<b>CO 3</b>