UPES
UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Electrical Machines **Semester:** 7th
Program: B Tech (Mechatronics) **Time :** 03 hrs.
Course Code: EPEG 4011P **Max. Marks:** 100

Instructions: Assume suitable data as per the subject.

SECTION A

(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Explain the constructional features of DC generator in detail.	4	CO3
Q 2	How commutation takes place in DC motor?	4	CO2
Q 3	A 200V DC shunt motor runs at 600 rpm when the armature current is 30A. Calculate the speed if the torque is doubled. Given that $R_a = 0.18\,\Omega$.	4	CO5
Q 4	Give the comparison of autotransformer with two winding transformer on various aspects.	4	CO4
Q 5	Explain the construction, principle of operation and application of AC Servomotor.	4	CO1

SECTION B

(4Qx10M= 40 Marks)

Q 6	With the help of neat sketch, explain about swinburne's test.	10	CO2
Q 7	A 5KVA, 1000/200 V, 50 Hz single phase transformer gave the following test results: Open circuit test (LV side): 200 V, 1.2 A, 90 W Short circuit test (HV side): 50 V, 5 A, 110 W. Compute the parameters of approximate equivalent circuit referred to LV side.	10	CO4
Q 8	Discuss with neat sketches the different electric braking methods used in three phase induction motor.	10	CO5
Q 9	Explain double field revolving theory. Based on double field revolving theory, prove that a single-phase induction motor is not self-starting.	10	CO1

SECTION-C

(2Qx20M=40 Marks)

Q 10	What are the different methods of speed control for DC motors. Explain with the help of equations in detail. Or Derive an expression for the torque developed in the armature of a D.C. motor. Determine developed torque and shaft torque of 220 V, 4 pole series motor with 800 conductors' wave-connected supplying a load of 8.2 kW by taking 45 A from the mains. The flux per pole is 25 m/Wb and its armature circuit resistance is 0.6 ohm.	20	CO3
Q 11	What are the various speed control techniques for induction machine. Explain in detail. A 3φ, 60Hz, 15HP,460V, 4 pole, 1728rpm induction motor delivers full output power to a load connected to its shaft. The windage and friction loss of the motor is 750W. Determine (i) mechanical power developed (ii) air-gap power (iii) rotor copper loss.	20	CO5