



PRESIDENCY UNIVERSITY

BENGALURU

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End - Term Examinations –May/June 2026

Date: 19-05-2026

Time: 09:30am – 12:30pm

School: SOE	Program: B.Tech-Electrical and Electronics Engineering		
Course Code: EEE2502	Course Name: DC Machines and Special Machines		
Semester: IV	Max Marks: 100	Weightage: 50%	

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	12	16	22	24	26

Instructions:

- Read all questions carefully and answer accordingly.
- Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	A DC series generator delivers a load current of 100 A at 500 V. The resistance of armature and series field are 0.03 ohm and 0.06 ohm respectively. Calculate the generated emf.	2 Marks	L3	CO1
2.	When does armature reaction occur in a DC generator? Define it.	2 Marks	L2	CO2
3.	List the methods to minimize the demagnetizing effect in DC generators.	2 Marks	L1	CO2
4.	Compare the variable and constant losses occurring in DC machines	2 Marks	L3	CO2
5.	A 220 V motor has an armature circuit resistance of 0.5 ohms. If the full load armature current is 20 Amperes, determine the back emf induced in the armature.	2 Marks	L2	CO3
6.	A stepper motor has 8 stator poles and 6 rotor teeth. Compute the step angle of the motor.	2 Marks	L2	CO4

7.	List the conditions for satisfactory operation of Switched Reluctance Motor.	2 Marks	L2	C04
8.	Compare the mechanical rectifier and the electronic rectifier.	2 Marks	L3	C05
9.	Mention some applications of the PMBL DC motor.	2 Marks	L1	C05
10.	Name the position sensors that are used for PMBL DC motor.	2 Marks	L1	C05

Part B

Answer the Questions.

Total Marks 80M

11.	a.	A Lap connected DC generated has 8 poles and 120 slots with 8 conductors in each slot. If the flux per pole is 0.05 wb,(i).Determine the emf generated when the speed is 750 RPM and (ii).What should be the speed of rotation if the induced emf is to be 500 volts.	10 Marks	L2	C01
	b.	Explain how a DC generator converts the alternating current induced in its armature into direct current using a mechanical rectifier. Describe the conversion process clearly with the help of neat sketches.	10 Marks	L2	C02

Or

12.	a.	A 4-pole generator having a wave-wound armature winding has 50 slots, each slot contains 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm, assuming the flux per pole to be 70 mwb?	10 Marks	L2	C01
	b.	Under what operating condition does armature reaction occur in a DC generator? Explain in detail how the armature flux interacts with the main field flux, and summarize the effects produced by this interaction.	10 Marks	L2	C02

13.	a.	In a testing laboratory, two identical DC shunt machines are coupled together and tested using Hopkinson's test to evaluate their performance under full-load conditions. During the test, the line voltage applied is 250 V. The total line current drawn from the supply, excluding the field currents of both machines, is observed to be 50 A. The armature current of the motor is measured as 380 A, while the field currents of the motor and generator are 4.2 A and 5 A, respectively. The armature resistance of each machine is 0.025 Ω . Based on the test data, determine the efficiency of the motor and Generator.	20 Marks	L3	C03
Or					

14.	a.	A 220 V DC shunt motor is installed in a small industrial workshop to drive a machine. During testing, the motor draws 4 A from the supply while running at rated voltage under no-load condition. The armature resistance of the motor is $0.5\ \Omega$ and the field resistance is $220\ \Omega$. When the machine is put into operation, the motor draws a load current of 50 A from the supply. Based on this operating condition, determine the efficiency of the motor and generator.	20 Marks	L3	C03
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15.	a.	Explain the Characteristics of stepper motor which consists of pull in torque and pull out curve curves.	10 Marks	L2	C04
	b.	(i). A stepper motor has a step angle of 2.5° . Find i) resolution, ii) number of steps required for 60 revolutions and iii) shaft speed if the stepping frequency is 3000 pulse/sec. (ii). A permanent magnet stepper motor receives pulses of 25 milli seconds duration. The motor has 5 stator poles and 4 rotor poles. Determine the time required for one complete revolution.	10 Marks	L3	C04

Or

16.	a.	Compare the Switched Reluctance Motor and Variable Reluctance Stepper Motor.	10 Marks	L3	C04
	b.	Explain the Variations of Inductance in Switched Reluctance Motor with respect to the relative positions of rotor teeth and stator poles.	10 Marks	L2	C04

17.	a.	A permanent magnet BLDC motor has a no-load speed of 4775 rpm when connected to a 150V supply. The armature resistance is $2.5\ \Omega$ and rotational and iron losses may be neglected. Determine the speed when the supply voltage is 75V, and the torque is 0.8N-m .	10 Marks	L3	C05
	b.	Derive the torque equation of a PMBLDC motor and illustrate its torque–speed characteristics with a neat graph.	10 Marks	L3	C05

Or

18.	a.	Describe the construction of a servo motor, explain the function of each component clearly.	10 Marks	L2	C05
	b.	Derive the voltage equation and torque equation of a servo motor.	10 Marks	L3	C05