Code: 19A27ET

IV B.Tech. I Semester Supplementary Examinations March / April 2023

Hybrid Electric Vehicles

(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.		Draw a general lay out of a EV and discuss the transmission characteristics.	14M	1	4
		OR			
2.	a)	Write a short note on basics of vehicle performance	7M	1	6
	b)	Compare conventional vehicle with Hybrid electric vehicle.	7M	1	5
		UNIT–II			
3.		Explain rolling resistance and aerodynamic drag in vehicles.	14M	2	1
		OR			
4.	a)	Explain about modelling of electric vehicle range?	7M	2	1
	b)	What are the factors affecting EV motor sizing?	7M	2	1
		UNIT–III			
5.	a)	What are factors affecting the performance of batteries used in EVs?	7M	3	1
	b)	What are different modes of charging batteries? Compare them in detail.	7M	3	1
		OR			
6.		Explain different fast charging techniques of electric vehicle in detail.	14M	3	1
		UNIT–IV			
7.	a)	Explain different architectures of hybrid electric vehicle?	7M	4	1
	b)	Write the applications of Hybrid Electric Vehicle?	7M	4	6
		OR			
8.	a)	Explain about the control principles of Plug-in Hybrid Electric Vehicle?	7M	4	1
	b)	Explain the concept of hybridization?	7M	4	1
		UNIT–V			
9.	a)	Explain different types of battery charger topologies?	7M	5	1
	b)	What are the charging power levels in Electric Vehicle?	7M	5	1
		OR			
10.		Design and analyze the Ultra Capacitors for Hybrid Electric Vehicles?	14M	5	4

END

Code: 19A27CT

IV B.Tech. I Semester Supplementary Examinations March/April 2023

Principles of Power Quality

(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.	a)	Discuss the various responsibilities of Suppliers of Electric Power?	7M	CO1	L2
	b)	Explain the following terms related with PQ problem. (i) Sags (ii) Swell (iii) Waveform distortion (iv) Harmonics (v) Voltage fluctuations	7M	CO1	L1
		OR			
2.		What are the major power quality issues? Explain in detail	14M	CO1	L1
		UNIT–II			
3.	a)	Differentiate between impulsive and oscillatory transients.	7M	CO2	L2
	b)	Discuss about the sources of sags and interruptions,	7M	CO2	L1
		OR			
4.	a)	What are the different voltage sag mitigation techniques? Explain in detail.	8M	CO2	L1
	b)	Write a note on over voltage and under voltages.	6M	CO2	L1
		UNIT–III			
5.	a)	Define triplen harmonics and explain its effects in power system?	7M	CO3	L1
	b)	Briefly explain the principles for controlling harmonics?	7M	CO3	L1
		OR			
6.		Explain in detail about evaluation of harmonic distortion?	14M	CO3	L3
		UNIT–IV			
7.	a)	Explain how the monitoring locations are chosen?	7M	CO4	L1
	b)	Discuss the objectives of power quality monitoring?	7M	CO4	L1
		OR			
8		Explain in detail about a) Flicker meters b) Harmonic analysers	14M	CO4	L1
		UNIT–V			
9.	a)	Explain the impact of Power quality from different DG types.	7M	CO5	L1
	b)	Discuss how the distribution line compensation is done.	7M	CO5	L1
		OR			
10.	a)	Explain about the various technologies for distributed generation?	7M	CO5	L1
	b)	Discuss about the protection issues for distributed generation?	7M	CO5	L1

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Code: 19A272T

IV B.Tech. I Semester Supplementary Examinations March / April 2023
Power Semiconductor Drives
(Electrical and Electronics Engineering)

Max. Marks: 70　　　　　　　　　　　　　　　　　　　　　　Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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			Marks	CO	BL

UNIT–I

1. a) Discuss the advantages of 3-phase controlled rectifier compared to 1-phase controlled rectifier — 7M　1　2

   b) Draw and explain the torque-speed characteristics of 1- semi converter controlled separately excited dc motor with neat diagram and expressions — 7M　1　2

OR

2. A separately excited dc motor having a speed of 10HP, 330V, 600 rpm is controlled by a 3- full converter has R_a= 0.4 , R_f=150 with star connected supply voltage V_1=220V, f=50Hz. The motor voltage constant is K_a=1.4V/A-rad/sec. the armature fields current is continuous and ripple free. Determine the following

   (i) The firing angle, if the field converter is operated at its rated current and the torque developed T=120N-m having a speed of 600 rpm

   (ii) The speed, if the firing angle of armature =0 and the torque developed T=20N-m

   (iii) The firing angle of field converter, if the speed is increased to 1200 rpm for the same conditions specified in — 14M　1　3

UNIT–II

3. a) Illustrate the operation of dual converter in the following two modes i) Without circulating current mode ii) With circulating current mode — 7M　2　2

   b) A dc chopper is used for regenerative braking of a separately excited dc motor. The dc supply voltage is 400V. The motor has Ra=0.2 , Ka =1.2 volt-sec/rad. The average armature current during regenerative braking is kept at 300A with neglisible ripple. For a duty cycle of 60% for a chopper. Determine,
   (i) power return to the dc supply
   (ii) Minimum and maximum permissible braking speeds
   (iii) Speed during regenerative braking. — 7M　2　3

OR

4. a) Draw and discuss the block diagram of closed loop operation of DC motor — 7M　2　2

   b) The chopper is used for on-off control of dc separately excited motor, supply voltage of 230V dc and on-time of 10 ms and off-time of 15 ms. Neglecting armature inductance and assuming continuous conduction of motor current. Calculate the average load current when the motor speed is 1500 rpm and has a voltage of Kv=0.5 V/rad/sec and Ra=3 — 7M　2　3

UNIT–III

5. a) Discuss the four quadrant operation of chopper fed separately excited dc drive with neat diagrams. — 7M　3　2

   b) Describe with the suitable diagram for one quadrant chopper controlled separately excited dc motor drive — 7M　3　2

OR

6. a) Discuss with the suitable diagram for two quadrant chopper controlled dc series motor drive | 7M | 3 | 2

   b) Draw and discuss the block diagram of closed loop operation of chopper fed DC motor | 7M | 3 | 2

UNIT–IV

7. a) Draw and describe the typical torque- speed characteristics of a poly phase induction motor | 7M | 4 | 2

   b) A 3- squirrel cage induction motor is developing torque of 1500 sync. Watts at 50 Hz and 1440 rpm (synchronous speed is 1500 rpm). If the motor frequency is now increased to 75 Hz using constant power mode, determine the new value of torque developed by motor at constant slip. | 7M | 4 | 3

OR

8. a) Discuss the controlling of an induction motor drive with variable frequency control with a constant (v/f) and draw the characteristics. | 7M | 4 | 2

   b) A 3- , star connected, 60HZ, 4 pole induction motor has the following constants in ohms per phase referred to the stator

   $R_1=R_2=0.024$

   $X_1=X_2=0.18$

   The motor is controlled by the variable frequency control with a constant (v/f). Determine the following for an operating frequency of 0.012 kHz.
   (i) The breakdown torque as a ratio of its value at rated frequency for motoring and braking
   (ii) The starting torque and rotor current in terms of their values at the rated frequency. | 7M | 4 | 3

UNIT–V

9. a) What is slip power recovery drive and explain in detail? | 7M | 5 | 2

   b) Discuss the principle of static Kramer drive with neat diagram and expressions | 7M | 5 | 2

OR

10. a) Discuss the concept of load commutated CSI fed synchronous motor and draw its waveforms | 7M | 5 | 2

   b) Describe the operation of self-controlled synchronous motor by cyclo converter | 7M | 5 | 2

END

Code: 19A271T

IV B.Tech. I Semester Supplementary Examinations March/April 2023

Distribution of Electrical Power

(Electrical and Electronics Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks	CO	BL

UNIT–I

1. a) Explain briefly classification of loads? How is load modeling done in distribution networks? — 5M, CO 1, BL 2

   b) The annual peak load on a 30mw power station is 25 mw. The power station supplies loads having maximum demands of 10mw, 8.5mw, 5mw and 4.5mw. The annual load factor is 45%. Find i) Average load ii) Energy supplied per year iii) Demand factor iv) Diversity factor — 9M, CO 1, BL 5

OR

2. a) Explain the single line diagram of radial type primary feeder and mention the factors that influence the selection of primary feeder — 7M, CO 1, BL 2

   b) Explain basic design practice of secondary distribution system and also discuss about secondary banking. — 7M, CO 1, BL 2

UNIT–II

3. a) Discuss the requirements and design features of distribution systems — 6M, CO 2, BL 2

   b) Consider the singe phase radial distributor shown in the figure below. The magnitude of load currents, p.fs and distances are indicated in the figure. The resistance and reactance of each wire are 0.1   per km and 0.2   per km respectively. It is required to maintain voltage at point B as $230\angle 0^0$ volts. Find voltage drop in the three sections and total voltage drop in the feeder. The p.f. angles of individual loads are w.r.t. voltage at point B.
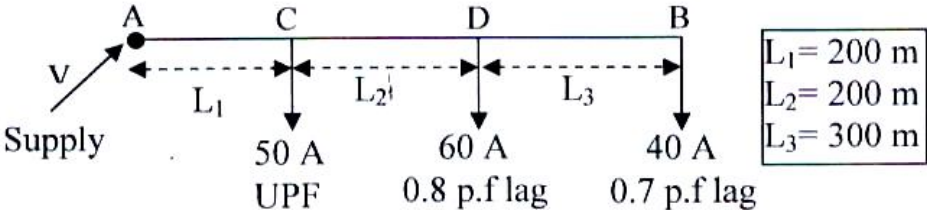
— 8M, CO 2, BL 5

OR

4. a) Write the comparison between DC and AC distribution systems — 4M, CO 5, BL 2

b) A single phase distributor 2 km long supplies a load of 120A at 0.8 p.f. lagging at its far end and a load of 80A at 0.9 p.f lagging at its mid point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km are 0.05 and 0.1 respectively. If the voltage at the far end is maintained at 230v, Find i)voltage at the sending end ii)phase angle between voltages at the two ends   10M   2   5

UNIT–III

5. a) Explain the classification of substations according to design   7M   3   2

b) Compare the four and six feeder patterns of substation service area if they are thermally loaded   7M   3   2

OR

6. a) Mention the various factors that are to be considered in selecting the ideal substations   7M   3   2

b) Explain the Double bus-Single breaker scheme.   7M   3   2

UNIT–IV

7. a) Derive the equation for load power factor for which the voltage drop is maximum   7M   4   2

b) A 3 Phase, 500 H.P, 50 Hz, 11 kV star connected induction motor has a full load efficiency of 85% at a lagging p.f. of 0.75 and connected to a feeder. If it is desired to correct it to a p.f. of 0.9 lagging load. Determine the following: (i) The size of the capacitor bank. (ii) The capacitance of each unit if the capacitors are connected in star as well as delta   7M   4   5

OR

8. a) Explain the effect of shunt compensation on distribution system.   7M   4   2

b) A single-phase motor connected to a 240V, 50 Hz supply takes 20 A at p.f. of 0.75 lag. A capacitor is shunted across the motor terminals to improve the p.f to 0.9 lag. Determine the capacitance of the capacitor to be used.   7M   4   5

UNIT–V

9. a) Draw a block diagram and explain for a typical distribution system planning process   7M   5   2

b) Explain the various factors affecting the distribution system planning?   7M   5   2

OR

10. a) Explain the importance of Load forecasting?   6M   5   2

b) Draw and explain the flow chart for the distribution system planning process?   8M   5   2

END