Hall Ticket Number :										

R-15

Code: 5G254

III B.Tech. I Semester Supplementary Examinations August 2021

Electrical and Electronics Measurements

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Discuss the operation of PMMC instrument with neat sketch	10M		2
	b)	A 50A, 230V, meter on full load makes 61 revolutions in 37 seconds. If the normal disc speed is 500 revolution per Kwh find the % error.	4M	1	3
		OR			
2.	a)	Explain the working of a moving iron type instruments. Derive the expression for Torque produced.	10M	1	2
	b)	Define the following torques. i) Deflection Torque ii)Control Torque iii)Damping Torque	4M	1	2
		UNIT–II			
3.	a)	Discuss the working principle of Dynamometer type wattmeter with its constructional diagram and derive the expressions.	10M	2	2
	b)	List out the methods used for wattmeter calibration	4M	2	2
		OR			
4.		Discuss the working principle of Induction type energy meter with neat sketch and draw the phasor diagram.	14M	2	2
		UNIT–III			
5.	a)	Describe the Construction diagram and operation of AC potentiometer	10M	3	2
	b)	Distinguish between AC and DC Potentiometers.	4M	3	1
		OR			
6.		Explain the construction and working of Weston type frequency meter along with a neat diagram..	14M	3	2
		UNIT–IV			
7.	a)	Kelvin double bridge is balanced with the following constants: outer ratio arm 100ohm & 1000 ohm ; inner ratio arms, 99.92ohm and 1000.6ohm; resistance of link 0.1 ohm, standard resistance 0.00377 ohm. Calculate the value of unknown resistance.	10M	4	3
	b)	List out the methods used for low resistance measurement.	4M	4	1
		OR			
8.	a)	Draw the Anderson bridge and derive the expression for balancing the bridge	10M	4	3
	b)	Define the following i)Quality Factor ii)Dissipation factor	4M	4	1
		UNIT–V			
9.		Discuss about i) Digital frequency meter ii) Digital multimeter iii) Digital Tachometer.	14M	5	2
		OR			
10.		Discuss the construction and working of Digital Storage Oscilloscope along with a neat sketch	14M	5	2

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Hall Ticket Number :										

R-15

Code: 5G251

III B.Tech. I Semester Supplementary Examinations August 2021

Electrical Machines-III

(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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UNIT–I

1. a) Explain how the harmonics in the generated EMF can be suppressed in synchronous machines. 6M

   b) A 3-Ph, 50 Hz, 8 pole alternator has a star connected winding with 120 slots and 8 conductors/slot. The flux per pole is 0.05wb, sinusoidally distributed. Determine the phase and line voltages. Let the winding factor as 0.956. 8M

OR

2. a) What are harmonics? Explain the causes for harmonics 7M

   b) 3-Ph, Y connected alternator has following data:
   Voltage generated on O.C is 4000V at 50Hz, Speed is 500 rpm, stator slots/pole/ph is 3, conductors/slot is 12. Compute the no. of poles and useful flux/pole. Assume all conductors/ph to be connected in series and coil to be full pitched. 7M

UNIT–II

3. a) Explain the effect of load power factor on armature reaction of 3 ph alternator. 7M

   b) Find the voltage regulation at full load, 0.9 power factor lagging for a three phase, 1000kVA, 5000 V, star connected alternator having an armature resistance of 0.08Ω per phase and a synchronous reactance of 7Ω per phase. 7M

OR

4. 'Synchronous impedance method of computing the voltage regulation leads to pessimistic value'–Justify your answer. 14M

UNIT–III

5. a) Discuss the need for connecting the alternators in parallel. Mention the conditions for parallel operation of alternators. 7M

   b) Two similar turbo alternators are rated at 25MW each. They are running in parallel. The speed-load curves of the driving turbines are such that the frequency of alternator-1 drops uniformly from 50Hz no load to 48Hz on full load and that alternator-2 from 50Hz to 48.5Hz. How will the two machines share a load of 30MW? 7M

OR

6. a) Define and derive the synchronizing power and torque with suitable vector diagrams. 7M

   b) Two 15KVA, 400V, 3-Ph alternators in parallel supply a total load of 25KVA at 0.8 p.f lagging. If one alternator shares half the power at UPF, determine the p.f and KVA shared by other alternator. 7M

UNIT–IV

7. a) Explain why the 3 – Ph synchronous motor is not a self-starting motor? 7M

   b) A 3 ph, 6600V, Y connected synchronous motor delivers 500KW power to a load. Its full load efficiency is 83%. Let Ra = 0.3 Ω/ph and X_s = 3.2 Ω/ph. Find the generated e.m.f and load angle when the machine is operating with 0.8 leading p.f. 7M

OR

8. Explain the variation of I_a Vs Cosϕ of 3-Ph synchronous motor w.r.t excitation with neat vector diagrams. From the analysis draw V and inverted V curves. 14M

UNIT–V

9. a) Explain the principle of operation of single phase induction motor. 7M
   b) Explain the operating principle of shaded pole motor. 7M

OR

10. a) Discuss with neat diagram about the construction of 1-Ph induction motor. 7M
    b) Explain in detail about cross - field theory. 7M

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Hall Ticket Number :										

R-15

Code: 5G253

III B.Tech. I Semester Supplementary Examinations August 2021

Power Electronics

(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	Blooms Level
		UNIT–I			
1.	a)	Explain the various turn-on methods of SCRs.	7M	CO1	L2
	b)	How do you known turn ON and turn OFF times from the switching characteristics? Explain.	7M	CO2	L4
		OR			
2.	a)	What are the problems associated with firing of parallel connected SCRs? Draw and explain circuit for firing of parallel connected SCRs	7M	CO1	L2
	b)	Draw and explain the necessity of static and dynamic equalizing circuit for series connected SCRs?	7M	CO1	L2
		UNIT–II			
3.	a)	Explain the two-transistor analogy of SCR.	7M	CO2	L2
	b)	Explain over voltage protection of SCRs using Metal Oxide Varistors.	7M	CO2	L2
		OR			
4.	a)	What is the need for a resistor in series with capacitor in snubber circuit of SCR. Explain with neat circuit diagram?	7M	CO2	L2
	b)	The specifications of a thyristor operating at a peak voltage of 500V are: Repetitive peak current=250A, $(di/dt)_{max}$=60A/µs, $(dv_a/dt)_{max}$=200V/µs. Take a factor of safety for the three specifications mentioned above. Design a snubber circuit if the minimum load resistance is 20Ω.	7M	CO6	L3
		UNIT–III			
5.	a)	What is the effect of source inductance in single phase full wave controlled bridge rectifier with *RL* load? Draw the voltage and current waveforms.	7M	CO3	L2
	b)	Explain the working of three phase semi converter with relevant wave forms with highly inductive load for firing angle of 30^0.	7M	CO3	L2
		OR			
6.	a)	What is phase angle controlled technique? Explain the operation of single phase, phase angle controlled rectifier. Derive the expression for average dc output voltage with relevant waveforms.	14M	CO3	L2
		UNIT–IV			
7.	a)	Explain with neat circuit diagram and waveforms the working of class A chopper.	7M	CO4	L2
	b)	A class-A chopper circuit has a load resistance of 100 ohms, capacitance of 10 micro farads and inductance of 10 mH. Find the time for which thyristor will remain in ON state. What will be the turn ON time if the load resistance is decreased to 25 ohms?	7M	CO6	L3
		OR			
8.	a)	Explain the operating principle of dc chopper with a suitable diagram. Derive expressions for average output voltage and rms output voltage.	7M	CO4	L2
	b)	Explain how thyristor is commutated in class-B chopper. What are disadvantages of this commutation circuit?	7M	CO4	L2
		UNIT–V			
9.	a)	What are pulse width modulated inverters? What are the different PWM techniques used in inverter?	7M	CO5	L2
	b)	Draw the single phase bidirectional ac voltage controller with *R* load and explain its working principle with waveforms.	7M	CO5	L2
		OR			
10.	a)	Explain the working of a 1-phase full bridge Inverter with RL load. Draw the relevant output waveforms.	7M	CO5	L2
	b)	A 50 Hz single phase full bridge produces a square wave voltage across load when operating from a 300 V DC supply, the AC load consists of a resistance of 30 Ω in series with inductance 15 mH. Determine the frequencies and rms values of the lowest order harmonics in the AC load current.	7M	CO6	L3

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Hall Ticket Number :										

R-15

Code: 5G252

III B.Tech. I Semester Supplementary Examinations August 2021

Transmission of Electric 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	Blooms Level
		UNIT–I			
1.	a)	Derive the expression for capacitance of a single phase overhead line.	7M		BL3
	b)	Find out the capacitance of single phase line of 30km long consisting of two parallel wires each 15mm diameter and 1.5m apart.	7M	CO1	BL3
		OR			
2.		Derive the capacitance calculations for symmetrical and asymmetrical single transmission lines from fundamentals.	14M	CO1	BL3
		UNIT–II			
3.		A 3 phase 100km line has the following constants. Resistance/phase/km =0.153 ohm, inductance/phase /km=1.21mH, Capacitance/phase /km= 0.00958μF. If the line supplies a load of 20MW at 0.9 pf lagging at 110kV at the receiving end calculate sending end current, sending end power factor, regulation and transmission efficiency using nominal T method.	14M	CO2	BL3
		OR			
4.		Draw the nominal T circuit of a medium length transmission line and derive expression for sending end voltage and current. Also draw the respective phasor diagram.	14M	CO2	BL3
		UNIT–III			
5.		Using rigorous method, derive expression for sending end voltage and current for a long transmission line.	14M	CO3	BL3
		OR			
6.		Explain the concepts of Skin, Proximity and Ferranti effects in detail with illustrations.	14M	CO3	BL2
		UNIT–IV			
7.	a)	Prove that a transmission line conductor between two supports at equal heights takes the form of a catenary.	7M		BL3
	b)	What is sag template? Explain how this is useful for location of towers and stringing of power conductors.	7M	CO4	BL2
		OR			
8.		Derive an expression for sag of a line supported between two supports of the same height. Also Explain the effect of ice and wind loading.	14M	CO4	BL3
		UNIT–V			
9.	a)	Describe the general construction of an underground cable with a neat sketch.	7M		BL2
	b)	A single core cable used on 33kV, 50Hz has conductor diameter 10mm and inner diameter of sheath 25mm. The relative permittivity of insulating material used is 3.5. Find (1) Capacitance of the cable per km (2) Maximum and minimum electrostatic stress in the cable (3) Charging current per km.	7M	CO5	BL3
		OR			
10.	a)	Explain any four insulating materials used in manufacturing cable.	7M		BL2
	b)	Find the economic size of a single core cable working on a 132kV three phase system, if a dielectric stress of 60KV/cm can be allowed.	7M	CO5	BL2

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