Hall Ticket Number :										

R-17

Code: 7G253

III B.Tech. I Semester Supplementary Examinations August 2021

Electrical Power Transmission

(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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Hall Ticket Number :										

R-17

Code: 7G251

III B.Tech. I Semester Supplementary Examinations August 2021

AC Machines-II

(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)	Describe the main constructional features of cylindrical rotor and salient pole alternators	7M	CO1	L2
	b)	For a three phase winding with 4 slots per pole per phase and with coil span of 10 slot pitches, calculate the values of distribution factor and coil span factor.	7M	CO3	L3
		OR			
2.	a)	What do you understand about the Harmonics generated in Induced EMF and suggest the methods to suppress the harmonics.	7M	CO2	L2
	b)	A 3-phase, star connected alternator on open circuit is required to generate a line voltage of 3600 v, 50Hz, when driven at 500 RPM. The stator has 3 slots per pole per phase and 10 conductors per slot. Calculate the number of poles and useful flux per pole. Assume all conductors per phase to be connected in series and coils are full pitched.	7M	CO3	L3
		UNIT–II			
3.	a)	Explain the concept of Armature reaction under different operating conditions	7M	CO1	L2
	b)	A three phase star connected alternator is rated at 1500KVA; 12000V.The armature effective resistance and synchronous reactance are 2 Ω and 35 Ω per phase respectively. Calculate the percentage regulation for a load of 1200 KW at 0.8 pf lagging.	7M	CO3	L3
		OR			
4.	a)	Define short circuit ratio and explain its significance in the operation of alternators	7M	CO2	L2
	b)	With a neat circuit diagram explain the procedure to conduct slip test for determination of X_d and X_q.	7M	CO2	L2
		UNIT–III			
5.	a)	What are the conditions for parallel operation of alternators and derive the power flow equations.	7M	CO5	L2
	b)	Discuss the operation of synchronous generator connected to infinite bus with necessary equations.	7M	CO5	L3
		OR			
6.	a)	Derive an expression for synchronous power and hence torque developed when two alternators are connected in parallel.	7M	CO5	L2
	b)	A 3 MVA, 6-pole alternator runs at 1000 RPM in parallel with other machines on 3.3 KV bus bars. The synchronous reactance is 20%. Calculate the synchronizing power per one mechanical degree of displacement and the corresponding synchronizing torque.	7M	CO3	L3

UNIT–IV

7.	a)	Explain the principle of operation of synchronous motor and derive an expression for torque developed.	7M	CO1	L2
	b)	Discuss different types of excitation in synchronous motor and explain the variation of current and power factor with excitation.	7M	CO3	L3
		OR			
8.	a)	Discuss the various starting methods of synchronous motor	7M	CO2	L2
	b)	Explain the operation of synchronous induction motor	7M	CO3	L3
		UNIT–V			
9.	a)	Why single phase motors are not self starting? Explain its operation based on cross field theory.	7M	CO1	L2
	b)	Draw and explain the construction and working of capacitor split single phase induction motor	7M	CO4	L4
		OR			
10.	a)	Explain the construction and working of A.C. Series motor with their characteristics.	7M	CO1	L2
	b)	What is a Repulsion motor? With a connection diagram explain its operation	7M	CO1	L4

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Hall Ticket Number :										

R-17

Code: 7GC51

III B.Tech. I Semester Supplementary Examinations August 2021

Environmental Science

(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)	Enumerate the scope and importance of environmental studies.	7M	1	2
	b)	With the help of neat diagram illustrate multidisciplinary nature of environmental studies.	7M	1	3
		OR			
2.	a)	Illustrate with neat sketch, composition of environment.	7M	1	3
	b)	Justify the need of public awareness in environmental protection.	7M	1	4
		UNIT–II			
3.	a)	Explain the resources of Forest and their uses.	7M	2	2
	b)	Compare renewable and non-renewable natural resources.	7M	2	3
		OR			
4.	a)	Enumerate the adverse impacts of extracting mineral resources.	7M	2	2
	b)	Explain the role of an individual in conservation of natural resources.	7M	2	3
		UNIT–III			
5.	a)	With neat sketch illustrate energy and material flow in environment.	7M	3	3
	b)	With neat sketch Illustrate carbon cycle.	7M	3	3
		OR			
6.	a)	Enumerate hot spots of biodiversity with examples.	7M	3	3
	b)	With neat diagram explain food chain, food web and Ecological pyramid.	7M	3	2
		UNIT–IV			
7.	a)	Explain causes and effects of surface and underground water pollution.	7M	4	2
	b)	Enumerate marine pollution from improper plastic waste disposal.	7M	4	3
		OR			
8.	a)	Briefly explain the effects of nuclear hazards with an example.	7M	4	2
	b)	Illustrate bio remediation of contaminated soil.	7M	4	3
		UNIT–V			
9.	a)	Illustrate with neat sketch causes and effects of ozone layer depletion.	7M	5	3
	b)	Discuss the importance of environmental protection act.	7M	5	2
		OR			
10.	a)	Enumerate the effects and control measures for population explosion.	7M	5	3
	b)	Explain the human rights in relation to environment.	7M	5	2

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Hall Ticket Number :										

R-17

Code: 7G254

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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