Hall Ticket Number :										

R-17

Code: 7G253

III B.Tech. I Semester Regular & Supplementary Examinations February 2021

Electrical Power Transmission

(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.		Derive the expression for inductance of three phase line with unsymmetrical spacing.	14M	CO1	BL3
		OR			
2.	a)	Calculate the GMR of a conductor having seven strands each of 3mm radius.	7M		BL3
	b)	Explain why and how transposition of three phase lines are done	7M	CO1	BL2
		UNIT–II			
3.		A 50Hz, 3 phase transmission line 30km long has a total series impedance of (40+j125) and shunt admittance of (10^{-3}j) mho. The load is 50MW at 220kV with 0.8pf lag. Find the sending end voltage, current, power factor, efficiency and regulation using nominal π-method.	14M	CO2	BL3
		OR			
4.	a)	With reference to long transmission lines, gives the physical interoperation of the following terms (i) Characteristics impedance (ii) Surge impedance (iii) Surge impedance loading (iv) Propagation constant.	7M		BL2
	b)	Derive the ABCD constants of medium transmission line with π configuration.	7M	CO2	BL3
		UNIT–III			
5.		Write brief notes on reflected and refracted waves in long length transmission lines with aid of case study.	14M	CO3	BL2
		OR			
6.		Determine the efficiency and regulation of a 3 phase 100 km, 50Hz transmission line delivering 20MW at a p.f of 0.8 lagging and 66kV to a balanced load. The conductors are copper, each having resistance 0.1Ω/km,1.5cm outside diameter, spaced equilaterally 2m between centers. Neglect reactance and use (i) Nominal T (ii) Nominal π method.	14M	CO3	BL3
		UNIT–IV			
7.		An overhead line at a river crossing is supported from two towers of heights 30 metres and 90 metres above water level with a span of 300 metres. The weight of the conductor is 1 kg/metre and the working tension is 2000 kg. Determine the clearance between the conductor and the water level mid-way between the towers.	14M	CO4	BL3
		OR			
8.		Explain about corona and string efficiency. Describe the methods of improving the string efficiency.	14M	CO4	BL3
		UNIT–V			
9.		With neat diagram, explain the various methods of grading of underground cables.	14M	CO5	BL2
		OR			
10.		A 11kv 3 phase underground feeder, 2km long uses three single core cables. The diameter of each conductor is 28mm and an insulation thickness of 4.4 mm and the relative permittivity of 4. Determine (i) Capacitance of the cable per phase (ii) charging current per phase (iii) total charging KVAR (iv) Dielectric loss per phase if the power factor of unloaded cable is 0.04.	14M	CO5	BL3

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Hall Ticket Number :										

R-17

Code: 7G251

III B.Tech. I Semester Regular & Supplementary Examinations February 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)	Define distribution factor and derive an expression for distribution factor of a winding having q slots per pole per phase and a slot angle of β.	7M	CO1	L2
	b)	What are the effects of Pitch factor and distribution factor on the generated EMF in an alternator?	7M	CO3	L3
		OR			
2.	a)	Derive an expression for the voltage induced in an alternator and discuss the role of different factors in the expression.	7M	CO2	L2
	b)	A 3-phase, star connected, 4 pole alternator has 60 slots with 2 conductors per slot. The pitch of the coil is 3 slots less than the pole pitch. The flux per pole is 0.125 wb. Calculate the No load terminal voltage, if the speed of the alternator is 1500 RPM.	7M	CO3	L3
		UNIT–II			
3.	a)	Explain in detail with necessary vector diagrams the procedural steps to find the voltage regulation of alternator using synchronous impedance method for full load, lagging and leading conditions.	7M	CO1	L2
	b)	A 10 KVA,440v,50Hz, star connected three phase alternator has the Open circuit characteristic given below: Field Current, A : 1.5 3.0 5.0 8.0 11.0 15.0 Terminal Voltage, V: 150 300 440 550 600 635 With full load, zero power factor applied on excitation of 14A, produced a terminal voltage of 500v. On short circuit, 4A excitation was required to give full load current. Determine the full load percentage regulation for 0.8 pf lagging.	7M	CO3	L3
		OR			
4.	a)	Derive an expression for voltage regulation of salient pole alternator based on two reaction analysis	7M	CO2	L2
	b)	The Direct axis and quadrature axis synchronous reactances of a salient pole synchronous generator are 1.0 and 0.6 p.u respectively. Draw the vector diagram for full load, 0.8 power factor lagging and calculate the No load voltage and load angle. Neglect effect of saturation and armature resistance.	7M	CO2	L2
		UNIT–III			
5.	a)	With neat diagrams, explain the procedure for dark lamp synchronization of alternators.	7M	CO5	L2
	b)	Two alternators working in parallel supply a lighting load of 3000KW and a motor load aggregating to 5000KW at 0.72 pf. One machine is loaded up to 5000KW at 0.8 pf lagging. What is the load and power factor of the other machine?	7M	CO5	L3

OR

6.	a)	Discuss the effect of change in excitation on parallel operation of two alternators.	7M	CO5	L2
	b)	With relevant equations, explain the load sharing procedure when two alternators are connected in parallel.	7M	CO3	L3

UNIT–IV

7.	a)	With neat diagrams, explain how the armature current and power factor varies with field current.	7M	CO1	L2
	b)	A 2200 v, 3-phase, star connected synchronous motor has a resistance of 0.22 Ω per phase and a synchronous reactance of 2.4 Ω per phase. The motor is operating with 0.6 pf leading with a line current of 180 A. Determine the value of generated EMF per phase.	7M	CO3	L3

OR

8.	a)	Explain the importance of 'V' and 'ʌ' curves and with neat circuit diagram explain the experimental procedure to obtain the curves.	7M	CO2	L2
	b)	What is meant by Hunting in synchronous motors and how this effect can be suppressed?	7M	CO3	L3

UNIT–V

9.	a)	Explain the principle of operation of single phase motor with the help of double revolving field theory.	7M	CO1	L2
	b)	With a neat connection diagram explain the construction and working of shaded pole motor	7M	CO4	L4

OR

10.	a)	Explain the operation and characteristics of universal motor	7M	CO1	L2
	b)	With a neat connection diagram explain the construction and working of Hysteresis motor	7M	CO1	L4

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Hall Ticket Number :										

R-17

Code: 7G252

III B.Tech. I Semester Regular & Supplementary Examinations February 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)	Derive the Torque equation of MI instruments with its advantages and disadvantages.	10M	1	2
	b)	Distinguish between Moving Coil and Moving Iron Instruments.	4M	1	3
		OR			
2.	a)	A Permanent magnet moving coil of dimensions 15mm X 12mm. Flux density in the air gap is 1.8 x 10^{-3} wb/m^2 and the spring constant is 0.14x10^{-6} Nm/rad. Determine the number of turns required to produce angular deflection of 90degree when a current of 5mA is flowing through a coil.	10M	1	2
	b)	Explain the classification of an analog instrument with an example	4M	1	2
		UNIT–II			
3.	a)	What is the necessity of Power factor meters? Discuss the operation of Low power factor meter with neat sketch.	10M	2	2
	b)	Explain about Creeping error in single phase induction type energy meter	4M	2	2
		OR			
4.		Derive the expression for deflecting and controlling torque for a single phase dynamometer wattmeter along with a neat diagram.	14M	2	4
		UNIT–III			
5.	a)	Describe the Construction and operation of Crompton's potentiometer.	10M	3	2
	b)	What are the applications of DC potentiometers? Discuss any one with circuit diagram.	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)	How capacitance is measured using Schering bridge. Derive the expression for unknown capacitance.	7M	4	3
	b)	Draw the Wein's bridge and derive the balance condition	7M	4	1
		OR			
8.	a)	Draw the neat sketch of Anderson's bridge and derive the bridge balance condition.	10M	4	3
	b)	In Maxwell's inductance –capacitance bridge the values of arms at balance are R2=200Ω ,R3=300 Ω , R4=500 Ω and C4=0.5 μF. Calculate the values of R1 and L1.	4M	4	1
		UNIT–V			
9.		Discuss the Lissajous pattern for the Measurement of phase, frequency, current & voltage.	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-17

Code: 7GC51

III B.Tech. I Semester Regular & Supplementary Examinations February 2021

Environmental Science

(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)	Categorize different components of environment and explain briefly.	7M	1	4
	b)	Explain the role of famous personalities and institutions in protection of environment.	7M	1	2
		OR			
2.	a)	Outline various segments of environment.	7M	1	4
	b)	Summarize the need of public awareness about environment.	7M	1	3
		UNIT–II			
3.	a)	Classify renewable natural resources and explain their potential contribution to energy sector.	7M	2	4
	b)	Enumerate the impacts of overgrazing	7M	2	3
		OR			
4.	a)	Differentiate traditional and modern agriculture. Analyse the effects of each type on environment.	7M	2	3
	b)	Explain the impacts of construction of dam on environment.	7M	2	2
		UNIT–III			
5.	a)	With neat sketch Illustrate Nitrogen cycle.	7M	3	3
	b)	Discuss the salient features of desert ecosystem.	7M	3	3
		OR			
6.	a)	Briefly explain threats to biodiversity with examples.	7M	3	3
	b)	Compare In-situ and Ex-Situ conservation of biodiversity.	7M	3	3
		UNIT–IV			
7.	a)	Define noise. Discuss causes, effects and control measures of noise pollution.	7M	4	2
	b)	Illustrate with neat sketch, adverse effects of Thermal Stratification on aquatic biota.	7M	4	3
		OR			
8.	a)	Enumerate the effects of air pollution on animals and plants.	7M	4	2
	b)	Briefly discuss causes and effects of soil pollution.	7M	4	3
		UNIT–V			
9.	a)	With neat sketch illustrate any two rain water harvesting techniques.	7M	5	3
	b)	Explain the importance of environmental ethics in education.	7M	5	2
		OR			
10.	a)	Illustrate with equations causes and effects of acid rain.	7M	5	3
	b)	Enumerate the salient features of wildlife protection act.	7M	5	2

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Hall Ticket Number :										

R-17

Code: 7G255

III B.Tech. I Semester Regular & Supplementary Examinations February 2021

Generation of Electric Power

(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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UNIT–I

1. a) Write the types of boilers and explain them in detail. 7M

   b) Explain the necessity of chimney and cooling towers 7M

OR

2. a) What are the functions of economizer and super heater in a thermal power plant? 7M

   b) Discuss about the function of turbine in thermal power station 7M

UNIT–II

3. a) Discuss about the selection of site for hydro generating station 7M

   b) Draw the typical layout of hydro power station and discuss its generation. 7M

OR

4. Classify and Compare different types of nuclear reactors. Explain any one of them in detail 14M

UNIT–III

5. Explain the principles of solar energy radiation 14M

OR

6. Describe with a neat sketch the working of a wind energy system with main components. 14M

UNIT–IV

7. What are possible environmental effects as a result of an operation of an OTEC plant? 14M

OR

8. What is meant by anaerobic digestion? What are the factors which affect bio digestion? Explain briefly. 14M

UNIT–V

9. What do you understand by power plant economics? Explain the fixed costs and operating cost of a power station 14M

OR

10. Explain the following with examples:

    (i) Flat rate tariff (ii) Block rate tariff (iii) Two part tariff
    (iv) Power factor tariff.

    Give the advantages and disadvantages of each. 14M

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Hall Ticket Number :										

R-17

Code: 7G254

III B.Tech. I Semester Regular & Supplementary Examinations February 2021

Power Electronics

(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)	Explain the switching characteristics of SCR briefly?	7M	CO1	L2
	b)	Draw the gate characteristics of a SCR and explain its importance in the design of gate drive circuit?	7M	CO1	L2
		OR			
2.	a)	What are the limitations of R-triggering circuit	7M	CO1	L2
	b)	With neat circuit diagram and waveforms explain the operation of RC firing circuit.	7M	CO1	L2
		UNIT–II			
3.	a)	Explain over current and over voltage protection in SCR.	7M	CO2	L2
	b)	Write short notes on protection against noise signals in gate and thermal protection of SCR	7M	CO2	L2
		OR			
4.	a)	With a neat circuit diagram explain complete SCR protection scheme.	7M	CO2	L2
	b)	Write short notes on high di/dt and high dv/dt protection for reliable operation of SCR	7M	CO2	L2
		UNIT–III			
5.	a)	Explain the operation of single phase full-wave controlled rectifier using center tapped transformer with R-L load under continuous mode of operation. Draw the waveforms of output voltage, voltage across SCR and average load current for $\alpha = 45^0$.	7M	CO3	L2
	b)	A single phase half controlled bridge converter is connected to R-L load with R = 10 Ω and L = 6 mH. The converter is supplied from 230 V, 50 Hz ac supply. Determine average and rms load current.	7M	CO6	L4
		OR			
6.		Draw the circuit diagram of three phase full wave controlled rectifier with *RL* load and explain its operating principle with voltage and current waveforms. Determine the following parameters for *RL* load with firing angle $\alpha = 30^o$: i) dc output voltage ii) Average dc load current iii) rms output voltage iv) rms load current v) Ripple factor	14M	CO6	L3
		UNIT–IV			
7.	a)	Explain the different control strategies in DC-DC choppers?	7M	CO4	L2
	b)	Discuss the principle of operation of four quadrant chopper.	7M	CO4	L2
		OR			
8.		Explain class A and class C choppers operation with neat circuit diagrams	14M	CO4	L2
		UNIT–V			
9.	a)	Explain the operation of single phase bridge inverter with the help of load voltage and load current waveforms for R-L Load.	7M	CO5	L2
	b)	Distinguish between an ac voltage controller and a cyclo-conveter.	7M	CO5	L2
		OR			
10.	a)	Compare VSI and CSI.	7M	CO5	L1
	b)	Draw the circuit and explain the operation of 1-ϕ to 1-ϕ step down cyclo-converter with R-load for $f_o=(1/3)f_s$. Indicate the conduction of each device.	7M	CO5	L3

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