Hall Ticket Number :										

R-20

Code: 20A45ET

III B.Tech. I Semester Supplementary Examinations June 2024

Introduction to Communication Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define modulation. Why modulation is required.	CO1	L1
b)	State the noise and its effects in communication system.	CO2	L1
c)	Draw the phasor diagram of narrow band FM.	CO3	L1
d)	List advantages of digital communications.	CO4	L1
e)	State different modulation schemes.	CO5	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
	UNIT-I			
2. a)	What is the principle of Amplitude modulation? Derive expression for the AM wave and draw its spectrum.	6M	CO1	L3
b)	An amplitude modulated voltage is given by $V = 50 (1 + 0.2 \cos 100 t + 0.001 \cos 3500t) \cos 10^6 t$. State all frequency components present in the voltage, and find modulation index for each modulating voltage term. What is the effective modulation index of V?	6M	CO1	L2
	OR			
3. a)	Elucidate meaning and the need of modulation	6M	CO1	L3
b)	Explain the square law detection of AM signals.	6M	CO1	L2
	UNIT-II			
4. a)	Explain the process of generation of VSB waves	6M	CO2	L2
b)	Explain how a SSBSC signal is generated using a filter method.	6M	CO2	L2
	OR			
5. a)	Draw the ring modulator and explain the generation of DSB-SC waves.	6M	CO2	L2
b)	Compare different amplitude modulation techniques.	6M	CO2	L2

UNIT-III

6.	a)	Discuss the process of Detection of FM Waves by Phase locked loop.	6M	CO3	L3
	b)	Consider an FM signal $s(t)=10\cos(2\pi 10^6 t + 8\sin 4\pi 10^3 t)$. Determine i) Modulation index ii) frequency deviation iii) power iv) bandwidth	6M	CO3	L3

OR

7.	a)	Derive the expression for single tone frequency modulated signal	6M	CO3	L3
	b)	Compare AM & FM in detail.	6M	CO3	L2

UNIT-IV

8.		Explain the delta modulation system with suitable diagrams?	12M	CO4	L2

OR

9.	a)	Explain with a neat block diagram of PCM system.	6M	CO4	L2
	b)	Compare DM, PCM, DPCM and ADM.	6M	CO4	L2

UNIT-V

10.	a)	Explain the generation and detection of PSK.	6M	CO5	L2
	b)	Explain the differences between ASK, PSK, FSK, DPSK system.	6M	CO5	L2

OR

11.	a)	Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection.	6M	CO5	L2
	b)	Describe the generation and coherent detection of Amplitude Shift Keying (ASK) signal.	6M	CO5	L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A251T

III B.Tech. I Semester Supplementary Examinations June 2024

Linear Control Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

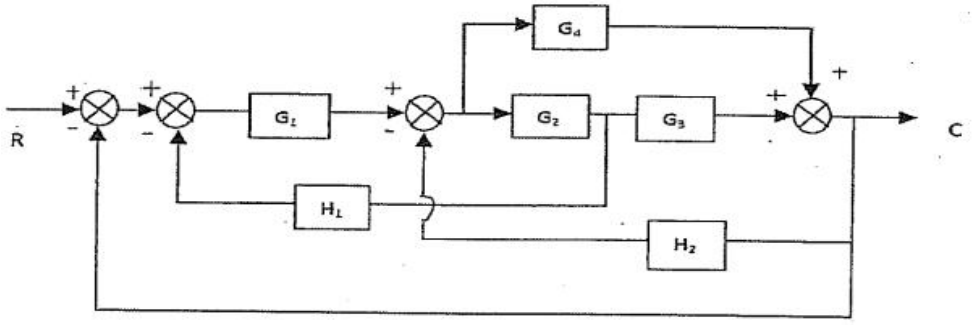
(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	What is an open loop system?	CO1	BL1
b)	Give the properties of signal flow graph?	CO3	BL2
c)	What is the difference between type and order of a system?	CO2	BL1
d)	What is called a proportional plus integral controller?	CO4	BL3
e)	Give the limitations of frequency response analysis.	CO3	BL2

PART-B

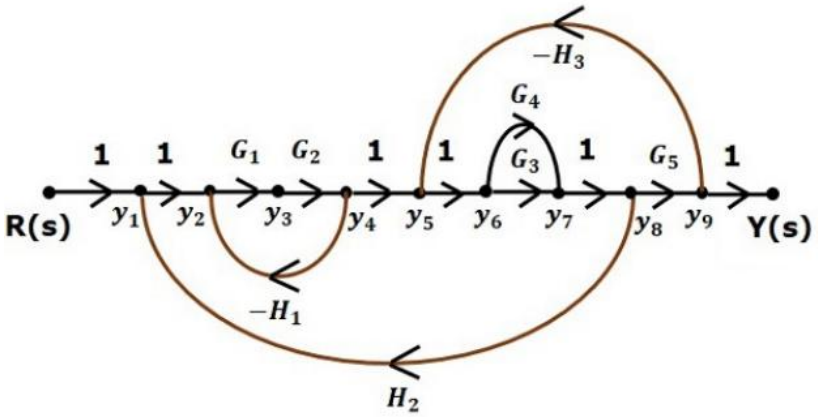
Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT-I			
2.	a)	Compare open loop and closed loop control systems with suitable examples.	4M	CO1	BL1
	b)	Simplify the block diagram shown below and determine its transfer function.	8M	CO3	BL2



OR

3.	a)	Explain the necessity and effects of feedback in control system?	4M	CO2	BL1
	b)	Obtain the overall gain for the following Signal flow graph using Mason's gain formula.	8M	CO3	BL2



UNIT-II

4.	a)	What are generalized error constants? State the advantages of generalized error Coefficients.	6M	CO1	BL1
	b)	Derive the expressions for peak time and settling time of standard 2nd order system when subjected to a unit step input.	6M	CO3	BL2
		OR			
5.	a)	The characteristic polynomial of a system is $s^7+9s^6+24s^5+24s^4+24s^3+23s^2+15s=0$. Determine the location of roots on s-plane and hence the stability of the system.	6M	CO4	BL2
	b)	Sketch the root locus of a feedback system when open loop transfer function is given by: $G(s).H(s) = \frac{K}{S(S+3)(S+5)}$	6M	CO5	BL3

UNIT-III

6.	a)	Draw the characteristic Nyquist plots. Give the procedural steps.	5M	CO2	BL2
	b)	Construct Nyquist plot for a feedback control system whose open loop transfer function is given by $G(s) = \frac{S}{(S-1)(S+1)}$ comment on stability of open loop and closed loop system.	7M	CO4	BL3
		OR			
7.		Sketch the Bode plot for the open-loop transfer function for the unity feedback system given below and obtain gain cross over frequency $G(s) = \frac{20}{s(1+3s)(1+4s)}$	12M	CO5	BL3

UNIT-IV

8.	a)	Draw electrical network configuration for phase lead compensator and hence derive the transfer function for the same.	7M	CO3	BL2
	b)	Explain the design procedure for lag compensation in frequency domain.	5M	CO2	BL1
		OR			
9.		The open-loop transfer function of a unity feedback control system is given by $G(S) = \frac{K}{S(1+0.2S)}$. Design a suitable compensator such that the system will have K_v= 15 and PM = 50°	12M	CO4	BL3

UNIT-V

10.	a)	Find the transfer function of the system with state space representation. $\dot{q} = Aq + Bu = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -4 & -2 \end{bmatrix} q + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$ y=Cq+Du =[5 1 0]+0.u	8M	CO3	BL2
	b)	Explain properties of state transition matrix.	4M	CO2	BL1
		OR			
11.	a)	Define Observability and explain	4M	CO2	BL1
	b)	Consider the system xc(k+1)=Ax(k)+Bu(k), y(k)=Cx(k). where $\left\{A = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix} B = \begin{bmatrix} 1 \\ 1 \end{bmatrix} and\ C = \begin{bmatrix} 0 & 1 \end{bmatrix}\right\}$ Show if the system is controllable. Find the transfer function $\frac{Y(z)}{U(z)}$. Can you see any connection between controllability and the transfer function?	8M	CO4	BL2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A252T

III B.Tech. I Semester Supplementary Examinations June 2024

Power Electronics

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. In Part-A, each question carries **Two marks.**

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define Turn on time of a SCR	1	1
b)	What is the difference between repetitive current and surge current rating of SCR.	2	2
c)	What is the function of freewheeling diode in a rectifier circuit?	3	2
d)	Define the term ripple factor.	4	1
e)	What is the ac machine used to serve the same purpose of ac voltage controller?	5	3

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
	UNIT-I			
2. a)	Explain dynamic characteristics of SCR	6M	1	1
b)	Describe dv/dt triggering of SCR	6M	1	2
	OR			
3. a)	Explain the operation of a power MOSFET.	6M	1	1
b)	What is commutation? Explain voltage commutation.	6M	1	2
	UNIT-II			
4. a)	Describe the current ratings of SCR for repetitive and non-repetitive type of waveforms.	6M	2	1
b)	Demonstrate Over voltage protection by Metal Oxide Varistors.	6M	2	3
	OR			
5. a)	Explain di/dt protection of SCR with the help of inductor.	6M	2	1
b)	Describe Cooling mechanism of SCR	6M	2	3

UNIT-III

6.		Draw the circuit diagram and currentwave forms for single phase fully controlled bridge rectifier with RL load in continuous current mode for various firing angles. Derive the generalized expression for average output voltage.	12M	3	3

OR

7.		Draw and explain the operation of three phase uncontrolled rectifier and draw the voltage and current waveforms for various elements in the circuit. Derive the express for average output voltage and current.	12M	3	3

UNIT-IV

8.		Draw and explain the operation of Boost converter with relevant waveforms. Derive the expression for average output voltage.	12M	4	3

OR

9.		Explain the operation of single quadrant and two quadrant choppers.	12M	4	2

UNIT-V

10.	a)	Draw and explain the operation of single phase series inverter.	6M	2	2
	b)	Describe the working of full wave type ac voltage regulator with RL load. Draw voltage and current waveforms.	6M	2	2

OR

11.	a)	Explain operation and control of single phase full bridge inverter.	6M	2	2
	b)	Explain the working of single phase bridge type Cyclo-converter for step down operation.	6M	2	2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A25DT

III B.Tech. I Semester Supplementary Examinations June 2024

Renewable Energy Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ***all*** the following short answer questions (5 X 2 = 10M)	CO	BL
a) Define solar constant.	1	1
b) State the principle involved in generating solar power.	2	2
c) How are winds classified?	3	2
d) List the characteristics of the tide.	4	1
e) What is geothermal field?	5	1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT-I			
2.	a)	Compare and contrast the availability of conventional and nonconventional energy sources.	6M	1	2
	b)	Explain the construction and working of pyranometer instrument used for measuring the solar radiation.	6M	1	2
		OR			
3.	a)	Define Renewable Energy Source. Discuss the advantages and limitations of Renewable Energy Sources.	6M	1	2
	b)	Write a short note on (i) Sun shine recorder, (ii) Solar radiation data	6M	1	1
		UNIT-II			
4.	a)	What is flat plate collector? Explain	6M	2	2
	b)	Explain the heat transport system used in liquid collectors.	6M	2	2
		OR			
5.	a)	How can classification of solar energy storage system be done? Explain them briefly	6M	2	2
	b)	Describe the construction of solar cell and solar PV panel.	6M	2	1
		UNIT-III			
6.	a)	Discuss the advantages and disadvantages of Wind Energy Conversion system.	6M	3	2
	b)	Derive the expression for Power in wind by stating the assumptions.	6M	3	3
		OR			
7.	a)	In details, discuss the site selection considerations for installation of WECS.	6M	3	2
	b)	Explicate in brief the performance characteristics of wind machines.	6M	3	3

UNIT-IV

8.	a)	Explain the 'single-basin' and 'two-basin' systems of tidal power harnessing. Further, discuss their advantages and limitations.	7M	4	2
	b)	What are the factors affecting the feasibility of a tidal power plant?	5M	4	1
		OR			
9.	a)	Explain different wave energy conversion machines	6M	4	2
	b)	Explain with a neat sketch the operation of OTEC plants.	6M	4	2

UNIT-V

10.	a)	Describe in detail how biomass conversion takes place	7M	5	2
	b)	Explain the combustion characteristics and economic aspects of biogas.	5M	5	2
		OR			
11.	a)	Explain a hot dry rock type Geothermal resource power plant.	5M	5	2
	b)	Describe in detail the operation dry binary cycle geothermal power plant.	7M	5	2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A253T

III B.Tech. I Semester Supplementary Examinations June 2024

Electric Power Transmission and Switch Gear

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

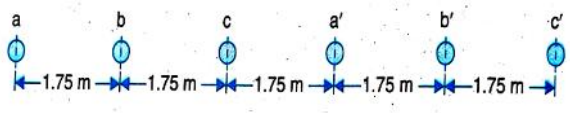
PART-A

(Compulsory question)

		CO	BL
1. Answer ***all*** the following short answer questions (5 X 2 = 10M)			
a)	Discriminate between self and mutual GMD	1	2
b)	Define Skin effect	2	2
c)	Define String efficiency	3	2
d)	What is armouring in an underground cable	4	2
e)	Define Restriking Voltage and Recovery Voltage	5	2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT-I			
2.	a)	Explain the concept of self GMD and mutual GMD for evaluating inductance of transmission lines.	6M	1	2
	b)	Determine the inductance per km/phase of a double circuit 3-phase line. The radius of each conductor is 15mm. 	6M	1	3
		OR			
3.	a)	Deduce the expression for inductance of a two-wire, single-phase transmission line.	6M	1	2
	b)	Calculate the capacitance of a three phase three wire transposed system. When the conductors are arranged at the corners of a triangle with sides measuring 1m,2m and 3m.Diameter of each conductor is 1.5cm	6M	1	3
		UNIT-II			
4.	a)	Explain the classification of lines based on their length of transmission.	6M	2	2
	b)	A load of three impedances each (6+j9) is supplied through a line having an impedance of (1+j2) ohm. The supply voltage is 400 volts 50 Hz. Determine the power input and output when the load is (i) Star connected and,(ii) Delta connected.	6M	2	3
		OR			
5.	a)	Derive ABCD Parameters of a medium Transmission line in Nominal π Method	6M	2	2
	b)	Determine the sending end voltage current, power and power factor for a 160 km section of 3-phase line delivering 50 MVA at 132 kV and p.f. 0.8 lagging. Also find the efficiency and regulation of the line. Resistance per line 0.1557 ohm per km, spacing 3.7m, 6.475m, 7.4m transposed. Evaluate the A, B, C, D parameters also. Diameter 1.956cm.	6M	2	3

UNIT-III

6.	a)	Explain about the types of insulators used for overhead lines.	6M	3	2
	b)	A conductor with [2.5 cm dia is passed centrally through a porcelain bushing ε_r = 4 having internal and external diameters of 3 cm and 9 cm respectively. The voltage between the conductor and an earthed clamp surrounding the porcelain is 20 kV r.m.s. Determine whether corona will be present in the air space round the conductor.	6M	3	3

OR

7.	a)	Derive the expressions for sag and tension when the supports are at unequal heights.	6M	3	2
	b)	A string of eight suspension insulators to be graded to obtain uniform distribution across the string. If the capacitance of the top unit is 10times the capacitance to ground of each unit, determine the capacitance of the remaining seven units.	6M	3	3

UNIT-IV

8.	a)	Explain about different types of cables with neat diagram	6M	4	2
	b)	The capacitance of a 3-core cable belted type are mrasured and found to be as follows: (i) between 3-cores bunched together and the sheath 8 μF (ii)between conductor and the other two connected together to the sheath 5 μF Calculate the capacitance to neutral and the total charging kVA when the cable is connected to a 11kV 50Hz 3-phase supply.	6M	4	3

OR

9.	a)	Explain briefly about the methods of Grading in Cables.	6M	4	2
	b)	The capacitance of a 3 core lead sheathed cable measured between any two of the conductors with sheath earthed is 0.19 μF per km. Determine the equivalent star connected capacity and the kVA required to keep 16 kms of the cable charged when connected to 20 kV, 50 Hz supply.	6M	4	3

UNIT-V

10.	a)	Explain with neat sketches the constructional and working of the SF6 circuit breakers.	6M	5	2
	b)	A circuit breaker is rated 1500A,1000 mva,33Kv,3 sec ,3-phase oil circuit breaker Find (i) the rated normal current (ii) breaking current (iii) making current (iv) short time rating current	6M	5	3

OR

11.	a)	Discuss the principle of operation of an air-blast circuit breaker. What are the advantages and disadvantages of using air as the arc quenching medium?	6M	5	2
	b)	A Circuit breaker is rated as 1500A,1000 MVA,33 Kv,3-Second,3-Phase oil circuit breaker .Find (i) rated normal current (ii) breaking capacity (iii) rated symmetrical breaking current (iv) rated making current (v)short-time rating (vi) rated service voltage	6M	5	3

*** End ***