CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: PYTHON PROGRAMMING

(Common for EEE, ME, ECE, CSE, IT, CSC & CSM)

Date: 07.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.

10x2=20M

1. Identify the difference between the if, if-else, if-elif-else statements. — 2 M
2. Outline the Characteristics of functions and modules. — 2 M
3. What are local variable and how they are used? — 2 M
4. Show the need of Void function. — 2 M
5. Summarize about two dimensional Lists. — 2 M
6. Discuss the need of Recursion. — 2 M
7. Determine the Benefits of Instances. — 2 M
8. Distinguish between Classes and Objects. — 2 M
9. Classify the need of Turtle graphics. — 2 M
10. How to use Widgets in python? — 2 M

PART-B
Answer the following. Each question carries TEN Marks.

5x10=50M

11.A). i) Identify the most Commonly used Repetition structures in Python — 5M

ii) Write a Python program to convert height in feet and inches to cm. [1 feet = 12 inch and 1 inch= 2.54 cm] (Sample input: 2 feet 7 inch Sample output: 78.74 cm) — 5M

OR

11. B). Summarize various operators, built-in functions and standard library modules that deals with python numeric type. — 10M

12. A). i) Outline the declaration and calling of functions in Python? Illustrate with an example. — 5M

ii) Demonstrate the process of storing functions in Modules. — 5M

OR

12. B). i) Write a Python program to print all prime numbers less than 256 using Functions — 5M

ii) What type of parameter passing is used in Python? Justify your answer with sample programs. — 5M

13. A). i) Demonstrate the process finding items in Lists with the in Operator. — 5M

ii) Illustrate a Python program that counts the number of occurrences of a letter in a string, using dictionaries. — 5M

OR

13. B). i) What is a list in Python? How to create nested lists? Demonstrate how to create and print a 3-dimensional matrix with lists. — 5M

ii) Write a python program to convert 'a, e, i, o, u' letters in a string with 'w, x, y, z, p' using string translate method. — 5M

(P.T.O..)

14. A). i) Classify the Techniques for Designing Classes. 5M
ii) Elaborate the implementation of hierarchical inheritance in Python, with a program. 5M

OR

14. B). i) Construct a python program to show the polymorphism in Python. 5M
ii) How does Instances are created in python show with an example? 5M

15. A). i) Can you categorize the different widgets in GUI designing. 5M
ii) Show the implementation of two dimensional shapes. 5M

OR

15. B). i) Elaborate the implementation of Radio Buttons, labels and Check Buttons in Python. 5M
ii) How to Develop a python program to show Button widgets and Info Dialog boxes? 5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: WEB PROGRAMMING

(Common for EEE, ME, ECE, CSD & AID)

Date: 07.08.2023 AN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.   10x2=20M

1.	How to preserve white space in XHTML?	2 M
2.	What is use of tag?	2 M
3.	What are <div> and <span> tags?	2 M
4.	What is an internal CSS?	2 M
5.	Define instance of operator in Javascript.	2 M
6.	What is the use of <noscript> tag?	2 M
7.	What is XSLT?	2 M
8.	Write the differences between XML and HTML.	2 M
9.	What is Ajax?	2 M
10.	Explain alert(), confirm() and prompt() methods of window object.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	What is a form? Explain form components with example.	10M
	OR	
11. B).	Differentiate XHTML and HTML.	10M
12. A).	Explain the basic table tags with the different attributes.	10M
	OR	
12. B).	What are Design issues of CSS? Explain in detail.	10M
13. A).	Explain various datatypes used in Javascript.	10M
	OR	
13. B).	i) Explain about Javascript operators.	5M
	ii) Write a Javascript to find factorial of a given number.	5M
14. A).	What do you mean by XML namespace? Explain in detail.	10M
	OR	
14. B).	What is DTD? Explain internal DTD and external DTD.	10M
15. A).	Explain about Ajax features.	10M
	OR	
15. B).	Explain about the Dojo Toolkit and XMLHttp request object.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023
Course Name: INTRODUCTION TO DATA SCIENCE
(Common for ECE, CSE, IT, CSC, CSM & AIM)

Date: 07.08.2023 AN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.   10x2=20M

1. Elaborate the concept of Big Data.   2 M
2. Explain the concept of NumPy in Python.   2 M
3. Define the term Visualization of data.   2 M
4. Distinguish between Bar Charts and Line Charts.   2 M
5. Explain the importance of Naïve Bayes.   2 M
6. Illustrate the concept of K- nearest Neighbors Classifications with suitable example.   2 M
7. Briefly elaborate the importance of Deep Learning.   2 M
8. Examine the Induction rule in brief.   2 M
9. Demonstrate the application of Data Science in Weather Forecasting.   2 M
10. Analyze implementation of Data Science in the Stock Market.   2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain about Matplotlib Python Programing tool kit for data science.   10M

OR

11. B). Classify the important concepts of Web Scraping.   10M

12. A). Explain about Bar charts and line charts with suitable diagrams.   10M

OR

12. B). Compare and contrast the differences between Cleaning and Munging techniques.   10M

13. A). Compare and contrast the differences between Supervised and Unsupervised Learning.   10M

OR

13. B). Distinguish between Support Vector Machine and Logic regression.   10M

14. A). Outline the concept of Decision trees and random forest.   10M

OR

14. B). Interpret the concept of Neural Networks for problem solving.   10M

15. A). Illustrate the applicability of Object Recognition in Data Science with suitable example.   10M

OR

15. B). Classify the importance of Real Time Sentiment Analysis.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023
Course Name: BUSINESS ETHICS & CORPORATE GOVERNANCE
(Common for EEE, ECE, CSE, IT, CSC, CSM, CSD, AID & AIM)

Date: 07.08.2023 AN | Time: 3 hours | Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.

10x2=20M

1. Can business ethics be taught and trained? — 2 M
2. Write in short about moral development. — 2 M
3. Ethics in HRM. — 2 M
4. Ethics of health care services. — 2 M
5. Cyber space. — 2 M
6. Ethical dimensions of cyber crimes. — 2 M
7. Does good governance really matters to corporations? — 2 M
8. Write in short about Board committees. — 2 M
9. Corporate risk. — 2 M
10. Effective corporate governance frame work. — 2 M

PART-B
Answer the following. Each question carries TEN Marks.

5x10=50M

11.A). Discuss the five myths about business ethics. — 10M

OR

11. B). Explain the kohlberg's study and carol Gilligan's theory. — 10M

12. A). Explain the ethics of finance and accounting professionals. — 10M

OR

12. B). Elaborate the concept of ethics of media marketing and ethical dilemma. — 10M

13. A). Discuss the social, political issues in the cyber space. — 10M

OR

13. B). Discuss mindset and skills of hackers and other criminals. — 10M

14. A). Explain the corporate governance in India-board structures. — 10M

OR

14. B). Explain the process and evaluation of corporate governance. — 10M

15. A). Discuss role of corporate governance in managing the risks. — 10M

OR

15. B). Explain the internal auditing's role in corporate governance. — 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023
Course Name: WASTE TO ENERGY
(Common for EEE, ECE, CSE, CSD & AID)

Date: 07.08.2023 AN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.

10x2=20M

1.	Explain different types of MSW.	2 M
2.	Define incinerator.	2 M
3.	Define Syngas.	2 M
4.	Explain about process of pyrolysis.	2 M
5.	Classify various types of gasifiers.	2 M
6.	Explain about Updraft gasifiers.	2 M
7.	Explain about Biomass Stove.	2 M
8.	Briefly discuss various types of Combustors.	2 M
9.	List out applications of biogas plants.	2 M
10.	Explain briefly about Bio-Chemical Conversion.	2 M

PART-B
Answer the following. Each question carries TEN Marks.

5x10=50M

11.A).	Discuss briefly about Agro based waste.	10M
	OR	
11. B).	Explain various types of digestors for waste management briefly.	10M
12. A).	Explain the manufacturing process of pyrolytic oils briefly.	10M
	OR	
12. B).	Discuss Slow and Fast Pyrolysis methods.	10M
13. A).	Draw Gasifier engine arrangement for production of Electric power and explain the methodology.	10M
	OR	
13. B).	Explain the design, construction and operation of fluidized bed gasifier.	10M
14. A).	Explain Design, Construction and Operation of Fixed bed combustor.	10M
	OR	
14. B).	Explain the Design, Construction and Operation of Fluidized bed combustor with neat sketches.	10M
15. A).	Discuss briefly about Biomass conversion processes.	10M
	OR	
15. B).	Explain the operation of Inclined grate combustors.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: DEEP LEARNING

(Common for ECE, CSC & CSD)

Date: 07.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.   10x2=20M

1.	Explain briefly about Deep feedforward networks.	2 M
2.	Explain briefly about forward propagation.	2 M
3.	Summarize L^2 Parameter Regularization.	2 M
4.	Demonstrate Dropout method.	2 M
5.	Illustrate Empirical Risk Minimization.	2 M
6.	Explain about Limited Memory BFGS.	2 M
7.	Show the convolution operation.	2 M
8.	Explain about the Gabor functions.	2 M
9.	Outline the Large-Scale Deep Learning Applications.	2 M
10.	Explain about Natural Language Processing (NLP).	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Choose the type of hidden unit to use in the hidden layers of the model.	10M
	OR	
11. B).	Make use of Back-Propagation and train a MLP.	10M
12. A).	Apply the early stopping meta-algorithm to determine at what objective value we start to overfit, then continue training until that value is reached.	10M
	OR	
12. B).	Explain about L^1 Regularization.	10M
13. A).	Identify the challenges in Neural Network Optimization.	10M
	OR	
13. B).	Choose Newton's Method for optimization of deep models.	10M
14. A).	Show that Convolution and Pooling as an Infinitely Strong Prior.	10M
	OR	
14. B).	Summarize the Convolution Operation.	10M
15. A).	Identify the applications of Deep Learning in Computer Vision.	10M
	OR	
15. B).	Identify the applications of Deep Learning in NLP.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: SIGNALS & SYSTEMS

(Common for EEE & ECE)

Date: 09.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks.   10x2=20M

1. Deduce the relation between signum function and unit step function.   2 M

2. Distinguish between continuous time and discrete time signals.   2 M

3. Find the Fourier transform of $e^{-at}u(t)$.   2 M

4. What is aliasing in the process of sampling?   2 M

5. Distinguish between signal bandwidth and system bandwidth.   2 M

6. State Paley-Wiener criterion for physical realizability.   2 M

7. Derive the relation between correlation and convolution.   2 M

8. Find the correlation of the symmetrical gate pulse of amplitude and time duration of '1' with itself.   2 M

9. Define ROC for z-transform.   2 M

10. Find the z-transform of $-a^n u[-n-1]$.   2 M

PART-B

Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) Categorize the following signal as power or energy signal. Also determine either power or energy of the signal   5M

$$x(t) = \begin{cases} 2; & 0 \le t \le 1 \\ 2-t; & 1 \le t \le 2 \\ 0; & otherwise \end{cases}$$

ii) Sketch the signal: f(t)=3u (t) + tu (t) – u(t–1) + u(t+1) – 5u (t–2)   5M

OR

11. B).   Obtain the Trigonometric Fourier series representation of half wave rectified sine wave.   10M

12. A).   i) Find the Fourier transform of $\cos(\omega_0 t)$.   6M

ii) Sketch the magnitude and phase spectrums of signum function.   4M

OR

12. B).   Determine Nyquist rate and Nyquist sampling interval of the following signals.   10M

(i) $\sin(200\pi t) + \sin(1000\pi t)$ (ii) $\sin(1000\pi t) \cos(2000\pi t)$

(P.T.O..)

13. A). Sketch the characteristics of ideal LPF, HPF, BPF and BRF.   10M

OR

13. B). For an LTI system described by a differential equation   10M

$\frac{d^2}{dt^2}y(t) + 4\frac{d}{dt}y(t) + 3y(t) = \frac{d}{dt}x(t) + 2x(t)$, the input is $x(t) = e^{-t}u(t)$. Determine its transfer function, impulse response and its output y(t).

14. A). Evaluate u(t)*e^{-t}u(t) and sketch the appropriate waveforms.   10M

OR

14. B). i) Distinguish between auto correlation and cross correlation with illustrations.   5M
ii) Derive the relation between input and output power spectral densities of a system.   5M

15. A). i) Determine the Laplace transform and the associate region of convergence for the   5M
function: x(t) = 1; $0 \leq t \leq 1$

ii) Find the inverse Laplace transform of the following: 5M

$X(s) = \frac{s+1}{s^2+5S+6}; \quad -3 < Re\{s\} < -2$

OR

15. B). Find the z- transform of the following sequences. Also specify ROC.   10M

(i) $x[n] = 7\left(\frac{1}{3}\right)^n u[n] - 6\left(\frac{1}{2}\right)^n u[n]$ (ii) $x[n] = \cos(n\omega)u[n]$

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular & Supplementary Examinations August-2023
Course Name: ELECTRONIC & PULSE CIRCUITS
(Electronics & Communication Engineering)

Date: 11.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.   10x2=20M

1.	Draw the circuit of a Darlington pair.	2 M
2.	What is stability in feedback amplifiers?	2 M
3.	Draw the h-parameter model of BJT.	2 M
4.	Define f_T of a Transistor.	2 M
5.	Classify large signal amplifiers.	2 M
6.	What is Harmonic distortion in transistor amplifier circuits?	2 M
7.	Classify the clamper circuits.	2 M
8.	State clamping circuit theorem.	2 M
9.	Mention two applications of Astable Multivibrators.	2 M
10.	Why collector catching diodes are used in multi vibrators?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain about Frequency response of an Two stage RC coupled Transistor amplifier by considering different frequency regions.   10M

OR

11. B). With the help of a suitable BJT based voltage series feedback amplifier diagram, explain the features and benefits of negative feedback in amplifiers.   10M

12. A). Discuss about the effect of Coupling and bypass capacitors on low frequency response of BJT Amplifiers.   10M

OR

12. B). Explain various high frequency parameters of a BJT and derive the relations between them.   10M

13. A). Explain the operation of class A push-pull power amplifier and show that the conversion efficiency of a transformer coupled power amplifier is 50%.   10M

OR

13. B). Draw the circuit and explain the working principle of a Class-B complementary symmetry push-pull power amplifier and state its disadvantages.   10M

(P.T.O..)

14. A). Sketch the response of High pass and low pass RC circuit for square input and derive the   10M
expression for rise time.

OR

14. B). Explain the operation of positive and negative clamper circuit and derive the necessary   10M
equations.

15. A). With the help of a neat circuit diagram, explain the working of fixed-bias bistable   10M
multivibrator. Draw its waveforms.

OR

15. B). i) How to calculate the pulse width of Monostable multivibrator?   5M
ii) Draw a Schmitt Trigger using transistors and derive for UTP & LTP.   5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular & Supplementary Examinations August-2023
Course Name: ANALOG & DIGITAL COMMUNICAITONS
(Electronics & Communication Engineering)

Date: 14.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.　　　　　　　　　　　 10x2=20M

1.	What percentage of power saved in DSB-SC when compared with AM?	2 M
2.	Explain the term quadrature null effect.	2 M
3.	Define pre-emphasis and de-emphasis	2 M
4.	Briefly explain the terms:	2 M
	a) Transit Noise b) Shot Noise	
5.	Define the Sampling theorem. What is the condition for aliasing?	2 M
6.	Mention two merits of DPCM.	2 M
7.	Explain how QPSK differs from PSK in term of transmission bandwidth and bit information it carries.	2 M
8.	What is eight phase PSK? Draw its constellation diagram.	2 M
9.	State the channel coding theorem for a discrete memoryless channel.	2 M
10.	Define entropy and mutual information.	2 M

PART-B
Answer the following. Each question carries TEN Marks.　　　　　 5x10=50M

11.A). With necessary circuit diagram and waveforms, explain how DSB-SC wave is generated using: i) Balanced Modulator ii) Ring Modulator.   10M

OR

11. B). i) Compare and contrast different AM Techniques.   5M

ii) A carrier signal $c(t)= 20\cos2\pi10^6t$ is modulated by a message $m(t)= 5\cos8\,\pi10^3t$ to generate DSB-SC signal. Sketch the spectrum and calculate band width, power, and modulation efficiency.   5M

12. A). i) State the Carson's and Explain in detail about NBFM and WBFM. Derive the expression for bandwidth of NBFM& WBFM.   7M

ii) Compare AM with FM.   3M

OR

12. B). i) Explain about noise effect in SSB-SC and obtain expression for figure of merit.   7M

ii) Explain pre-emphasis and de-emphasis. What are its advantages?   3M

13. A). Explain the drawbacks of DM system. Clearly describe how these errors can be overcome using Adaptive Delta Modulation with neat block schematics.   10M

OR

13. B). With the help of block schematics, discuss the elements present in Pulse Code Modulation (PCM) transmitter and receiver sections.   10M

(P.T.O..)

14. A). Explain the generation and detection (coherent detection) of PSK signal with a neat block diagram.   10M

<div align="center">OR</div>

14. B). i) Compare BASK, BFSK and BPSK.   4M
ii) Derive the probability of error expression for the Amplitude Shift keying technique.   6M

15. A). Calculate and compare the coding efficiency for the following message ensemble using both "Shannon- Fano Coding" and "Huffman Encoding" techniques.   10M

M1	M2	M3	M4	M5	M6	M7	M8
1/2	1/8	1/8	1/16	1/16	1/16	1/32	1/32

<div align="center">OR</div>

15. B). For a (7,4) Linear Block Code, the Generator Matrix   10M

$$G = \begin{vmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 \end{vmatrix}$$

i) Obtain all code words
ii) Find the parity check matrix H
iii) Determine the error correction and detection capabilities of this code
iv) Compute the syndrome for the received code vector R = [1 1 1 1 1 1 0]

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular/Supplementary Examinations August-2023
Course Name: ELECTRO MAGNETIC WAVES & TRANSMISSION LINES
(Electronics & Communication Engineering)

Date: 16.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.   10x2=20M

1.	Write the difference between convection current and conduction currents.	2 M
2.	Write the law of refraction for magnetic flux lines at a boundary with no surface current and write its significance.	2 M
3.	State Ampere's circuit law.	2 M
4.	Write Maxwell's equations in differential form.	2 M
5.	Give the relation between E and H?	2 M
6.	Define Total internal reflection.	2 M
7.	Give the condition for minimum attenuation in transmission lines.	2 M
8.	What are the primary parameters of transmission lines?	2 M
9.	What is the use of impedance transformation?	2 M
10.	What is mean by standing wave?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).   State and explain Coulomb's law. Obtain an expression in vector form.   10M

OR

11. B).   i) Four charges of 10 µC are placed at corners of a square. The coordinates of corners are   5M
$(1, 1, 0), (1, -1, 0), (-1, 1, 0),(-1, -1, 0)$. Find the force on a charge of 50 µC that is placed at $(0, 0, 2)$.

ii) Find the relation between E and V.   5M

12. A).   State and Prove Biot-Savart's Law.   10M

OR

12. B).   i)A circular loop located on $x^2+y^2=25$, z=0 carries a direct current of 20A along a_φ.   5M
Determine H at $(0, 0, 6)$ and $(0,0,-6)$.

ii) Explain Inconsistency of Ampere's law.   5M

13. A).   What is Poynting theorem? Derive the expression for Poynting vector.   10M

OR

13. B).   i) Define Brewster angle and Critical angles.   4M
ii) Obtain the oblique incidence of wave equations for parallel polarization.   6M

(P.T.O..)

14. A). Derive the equation of a two wire transmission line and mention its applications. 10M

OR

14. B). A 50 Ω distortion-less transmission line has attenuation 2.5 dB/m. The line has capacitance of 0.1 nF/m. Find R, L and G. 10M

15. A). Derive expressions for reflection coefficient and VSWR of a transmission line. 10M

OR

15. B). What is a Stub? Explain the designing steps of single stub matching. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech IV Semester Regular & Supplementary Examinations August-2023
Course Name: CONTROL ENGINEERING
(Electronics & Communication Engineering)

Date: 18.08.2023 AN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries TWO marks.
     10x2=20M

1. What are the advantages of closed loop control system?   2 M
2. What are the basic elements used for modeling mechanical translational system? Write the force balance equation of basic elements.   2 M
3. What is a signal flow graph and Write Masons Gain formula?   2 M
4. The Impulse response of a first order system is given by $y(t) = 4e^{-0.4t}$. Find the step response of the system.   2 M
5. If transfer function of the system is $1/(Ts+1)$, Find the steady state error to the unit step.   2 M
6. Consider a negative feedback system where $G(s) = 1/(s+1)$ and $H(s) = K/s(s+2)$. Find the range of 'K' to make the closed loop system is stable by using RH criteria.   2 M
7. Define the terms gain cross-over frequency and phase cross-over frequency.   2 M
8. How a Nyquist plot may be used to determine the stability of a closed loop system?   2 M
9. Write the properties of state transition matrix.   2 M
10. Write state model equations.   2 M

PART-B
### Answer the following. Each question carries TEN Marks.
     5x10=50M

11.A).   i) Compare and contrast the performance of an open loop control system and a closed loop control system.   5M

ii) Differentiate between negative feedback and positive feedback in terms of gain, bandwidth, time constant, speed sensitivity, and stability.   5M

OR

11. B).   Write the differential equations governing the mechanical translational system as shown in figure and determine the transfer function.   10M
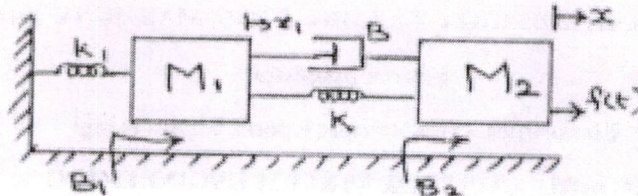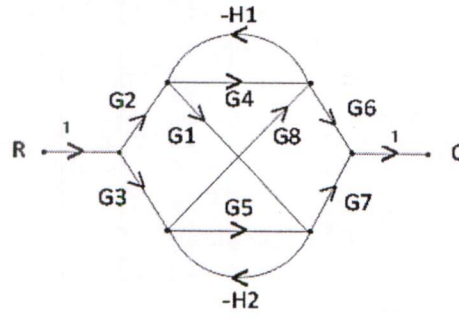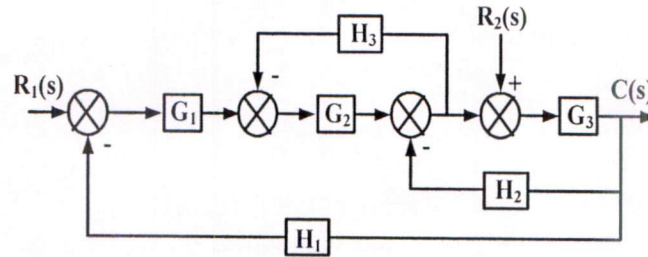
12. A). Obtain the transfer function C/R from the signal flow graph shown below. 10M

OR

12. B). Using block diagram reduction technique, find closed loop transfer function of the system whose block diagram is shown below (a) when $R_1 = 0$ (b) when $R_2 = 0$ 10M

13. A). The characteristic equation of feedback control system is 10M

$$s^4 + 20s^3 + 15s^2 + 2s + K = 0$$

i) Determine the range of K for the system to be stable.

ii) Can the system be marginally stable? If so, find the required value of K and the frequency of sustained oscillation.

OR

13. B). Find the steady-state error for unit step, unit ramp and unit acceleration inputs for the following systems. 10M

(i) $\dfrac{10}{s(0.1s+1)(0.5s+1)}$ (ii) $\dfrac{1000}{s^2(s+1)(s+20)}$

14. A). Draw the Bode plot for the transfer function. 10M

$$G(s) = \frac{16(1+0.5s)}{s^2(1+0.125s)(1+0.1s)}$$

From the graph determine

(i) Phase cross over frequency, (ii) Gain cross over frequency, (iii)P.M , (iv) G.M and (v) Stability of the system.

OR

14. B). Use Nyquist stability criterion to determine whether the transfer function of the system given below is stable or not. 10M

$$G(s)H(s) = \frac{60}{(s+1)(s+2)(s+5)}$$

(P.T.O..)

15. A). A single input single output is given as   10M

$$x(t) = Ax(t) + Bu(t)$$

$$x(t) = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

$$y(t) = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Test for controllability and observability.

OR

15. B). The closed loop transfer function is $\frac{y(s)}{u(s)} = \frac{160\,(s+4)}{s^3 + 8\,s^2 + 192\,s + 640}$ Obtain the state variable   10M
model.

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