H.T No: | | | | | | | | | | | **R18** **Course Code: A30405**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: SIGNALS & SYSTEMS

(Common for EEE & ECE)

Date: 21.02.2023 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

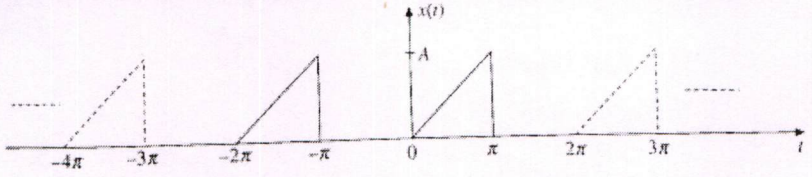
Each question carries TWO marks. **10x2=20M**

1. Define any 2 Properties of Fourier Series — 2 M
2. Explain the condition of Orthogonality for signals approximation. — 2 M
3. With the help of neat diagram discuss different types of sampling. — 2 M
4. Illustrate the concept of under sampling and oversampling with an example. — 2 M
5. Explain LPF and HPF Filter characteristics of the linear system. — 2 M
6. Find Transfer function of $6\frac{d2y(t)}{dt2} + 13\frac{dy(t)}{dt} + 4y(t) = 4\frac{dx(t)}{dt}$. — 2 M
7. State and prove Parseval's Theorem. — 2 M
8. Discuss about Energy Spectral Density and Autocorrelation. — 2 M
9. Find the Laplace Transform of the following signal (i) $x(t) = e^{-2t}\,u(t) + e^{-3t}\,u(t)$ and (ii) $x(t) = e^{2t}\,u(t) + e^{-3t}\,u(-t)$ — 2 M
10. Differences between Laplace Transform and Z-Transform. — 2 M

PART-B

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

11.A). Obtain Exponential Fourier Series of the waveform shown below. — 10M



OR

11. B). A rectangular function is defined as — 10M

$$X(t) = \begin{cases} A & 0 \le t \le \pi/2 \\ -A & \pi/2 \le t \le 3\pi/2 \\ A & 3\pi/2 \le t \le 2\pi \end{cases}$$

Approximate the above function by A Cos(t) between the interval $(0, 2\pi)$ such that mean square error is minimum?

(P.T.O..)

12. A). i) Determine the signal x(t) for the given Fourier Transform 5M
$X(e^{j\omega}) = 1 + 2\,e^{-j\omega} + 2\,e^{-2j\omega} + 3\,e^{-3j\omega}$

ii) State the Time Shifting property theorem of Fourier Transform. 5M

OR

12. B). i) State Sampling Theorem and Discuss about the types of sampling? 5M

ii) Find the sampling rate of the following input signals 5M

(a) $x(n) = \cos(0.125\pi n)$, (b) $x(n) = \sin(\pi + 0.2n)$

13. A). i) Explain in detail the design of Ideal High Pass Filter Characteristics. 3M

ii) Explain in detail the distortion less transmission through a system. 7M

OR

13. B). Determine free response of the system described by the differential equation 10M

i) $y(n) - 5/6\ y(n-1) + 1/6\ y(n-2) = x(n)$ for $y(-1) = 1$ and $y(-2) = 0$

ii) Determine forced response for $x(n) = (1/4)^n\ u(n)$

14. A). i) A Signal $x(t) = \text{Sin}(\omega_o t)$ find its $R(\tau)$ and Energy Density Spectral. 5M

ii) Write 3 Properties of Correlation function. 5M

OR

14. B). i) Define Cross Correlation with an example. 5M

ii) State and prove any 3 Properties of cross correlation. 5M

15. A). i) State and prove any 3 Properties of Laplace Transform. 5M

ii) Find Z Transform of $X(Z) = (1+3Z^{-1}) / (1+6Z)$. 5M

OR

15. B). i) Let $X(Z) = Z / (Z^2 + 3Z + 2)$ Sketch the ROC if the sequence x(n) is a two sided sequence. 5M

ii) Using Convolution Theorem of Laplace Transform find $y(t) = [x_1(t) * x_2(t)]$; for the signals defined below 5M

(a) $x_1(t) = \text{Sin}3t\ u(t)$ and $x_2(t) = \text{Cos}2t\ u(t)$

(b) $x_1(t) = t\ u(t)$ and $x_2(t) = t\ u(-t)$

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30406**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: ELECTRONICS & PULSE CIRCUITS

(Electronics & Communication Engineering)

Date: 23.02.2023 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. List the advantages of a transformer coupled amplifier. 2 M
2. What is the effect of negative feedback on amplifier gain? Prove it. 2 M
3. What is the effect of coupling capacitors in BJT amplifiers? 2 M
4. What is CE short circuit current gain? 2 M
5. Tell about distortion in the power amplifier. 2 M
6. List the advantage of push-pull configuration. 2 M
7. How the RC circuit behaves as an integrator? 2 M
8. Define clamping circuit theorem. 2 M
9. Compare DC coupling and AC coupling. 2 M
10. Why commutating capacitors are required? 2 M

PART-B

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

11.A). Analyze 2 stage RC coupled amplifier and develop expressions for Current gain, Voltage gain, input Resistance and Output Resistance. 10M

OR

11. B). i) Construct the bandwidth of a multistage amplifier, assuming that each stage has the same upper and lower cut off frequencies. 5M

ii) Find the gain A_f, the input resistance R_{if}, and the output resistance R_{of} of the closed loop amplifier for a voltage-series feedback amplifier employs a basic amplifier with input and output resistances each of 2kΩ and gain A = 1000 V/V. The feedback factor β = 0.1 V/V. 5M

12. A). i) Explain the parameters of hybrid – π model with neat equivalent circuits. 5M

ii) Develop the expression for CE Short Circuit Current Gain A_i as a function of frequency. Draw the frequency Response Curve. 5M

OR

12. B). i) Prove that $h_{ie} = r_{bb} + r_{b'e}$. 4M

ii) Transistor has h_{ie} = 6kΩ and h_{fe} = 224 at I_c = 1mA, with f_T = 80MHz and $C_{b'c}$ = 12pF. Determine g_m, $r_{b'e}$, $r_{bb'}$ and $C_{b'e}$ at room temperature. 6M

(P.T.O..)

13. A). Explain the working of the series fed class A amplifier with suitable circuit and derive the expression for efficiency. 10M

OR

13. B). i) Demonstrate about heat sinks. 5M

ii) Explain about class B Push-pull amplifier with a circuit diagram. 5M

14. A). i) Analyze the response of a low-pass RC circuit for a square input for different time constants. 7M

ii) List the applications of the voltage comparator. 3M

OR

14. B). i) Justify how a high-pass RC circuit acts as a differentiator. 4M

ii) Discuss in detail about negative Peak Clamper with neat sketches. 6M

15. A). Explain the operation of a Fixed-bias Bistable Multivibrator with relevant waveforms. 10M

OR

15. B). i) Identify and apply appropriate multivibrating technique to convert any signal to a square signal, using two transistors. 7M

ii) Distinguish between: 3M

a) Stable State and a Quasi-Stable State.

b) Symmetrical and Unsymmetrical triggering

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H.T No: | | | | | | | | | | | **R18** Course Code: A30407

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: ANALOG & DIGITAL COMMUNICATIONS

(Electronics & Communication Engineering)

Date: 25.02.2023 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 is over modulation in AM? 2 M
2. List the advantages of SSB modulation over DSBSC modulation. 2 M
3. What are the advantages of FM over AM? 2 M
4. What is the use of AWGN? 2 M
5. What is slope overload distortion? 2 M
6. What is the advantage of DM over PCM system? 2 M
7. What is the difference between PSK and FSK? 2 M
8. What are the advantages of QPSK over BPSK? 2 M
9. Define entropy. 2 M
10. Define Information rate. 2 M

PART-B

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

11.A). Explain time domain and frequency domain representation of AM waves with necessary waveforms. 10M

OR

11. B). Discuss generation of SSB using Frequency and phase discrimination methods. 10M

12. A). Discuss FM detection using Foster Seeley Discrimination method. 10M

OR

12. B). Explain super heterodyne receiver with neat block diagram. 10M

13. A). Prove the Sampling theorem along with definition. 10M

OR

13. B). Discuss the generation of PCM method with neat block diagram. 10M

14. A). Explain generation and demodulation of BPSK scheme with block diagram and necessary wave form. 10M

OR

14. B). Calculate the band width and Probability of error of Binary FSK and binary PSK. 10M

(P.T.O..)

15. A). An event has six possible outcomes with the probabilities $p_1=1/2$, $p_2=1/4$, $p_3=1/8$, $p_4=1/16$, $p_5=1/32$ and $p_6=1/32$. Find the entropy of the system. Also find the rate of information if there are 16 outcomes per second. 10M

OR

15. B). Calculate coding efficiency for the following messages with their probabilities using Huffman coding. 10M

[X]= $[x_1, x_2, x_3, x_4, x_5, x_6, x_7]$

[P]=[0.4,0.2,0.12,0.08,0.08,0.08,0.04]

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30408**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: ELECTRO MAGNETIC WAVES & TRANSMISSION LINES

(Electronics & Communication Engineering)

Date: 28.02.2023 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. State Coulomb's law. 2 M
2. What is Isotropic and Homogeneous medium? 2 M
3. What is Magnetic flux and Density? 2 M
4. Write down the magnetic boundary conditions. 2 M
5. What is Polarization of a wave? 2 M
6. Define Brewster angle. 2 M
7. What is the relation between primary constants and Characteristic Impedance Z_0? 2 M
8. Define the terms phase velocity and group velocity. 2 M
9. What is the expression for Characteristic Impedance Z_0 in terms of Zoc and Z_{sc}? 2 M
10. What is Stub matching? 2 M

PART-B

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

11.A). i) Establish Gauss Law in point form and integral form. 5M

ii) Two uniform line charges of density 8nC/m are located in a plane with y=0 at x= ± 4m. Find the Electric field at a point P(0m, 4m, 10m). 5M

OR

11. B). i) Derive the relationship between Electric potential and Electric field. 5M

ii) Write short note on Continuity Equation. 5M

12. A). i) Explain the concept of Magnetic vector potential. 5M

ii) What is inconsistency associated with Ampere's law and how is it modified? 5M

OR

12. B). i) State Maxwell's equations in integral and point form for general time varying fields. 5M

ii) Explain the boundary conditions of the electric fields for dielectric-dielectric interface. 5M

13. A). Derive Wave Equations for conducting medium. 10M

OR

13. B). i) Prove that uniform plane wave does not have field component in the direction of propagation. 5M

ii) Describe the concept of Reflection of an EM wave by a perfect dielectric at normal incidence. 5M

(P.T.O..)

14. A). Derive the transmission line equations for V and I in terms of the source parameters. 10M

OR

14. B). i) What is a Distortion less Line? Derive the condition for distortion less transmission line. 5M

ii) The constants per km of a certain cable are: R = 10 ohms; L = 3.7 mH; C = 0.0083 μfarads and G = 0.4 μ mhos. Calculate the attenuation constant and phase constant at 1000 Hz. 5M

15. A). Derive the expression for single stub matching. 10M

OR

15. B). i) Explain the significance and utility of λ/8 and λ/4 lines. 5M

ii) Explain various applications of smith chart. 5M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30531**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: PYTHON PROGRAMMING

(Common for CE, ME, ECE, CSE & IT)

Date: 04.03.2023 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 read input and print output in python? 2 M
2. How Type conversion is done in python? 2 M
3. Define File. 2 M
4. Differentiate between local and global variables. 2 M
5. What is the purpose of string slicing? 2 M
6. Why recursion is used give example? 2 M
7. Define polymorphism. 2 M
8. What is object? 2 M
9. Give the syntax for button and dialog box. 2 M
10. What is image processing? 2 M

PART-B

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

11.A). Explain various control structures supported in Python each with respective example program. 10M

OR

11. B). List and explain operators supported by Python. Demonstrate python code to print all prime numbers less than 256. 10M

12. A). Define a Function and explain default, keyword and variable length arguments in functions. 10M

OR

12. B). Explain the class design techniques with example. And write a python program to print the area of circle. 10M

13. A). What is a string and explain different string manipulations techniques? 10M

OR

13. B). Discuss about Lists, Dictionaries, sets and Tuple each with and executable code. 10M

14. A). List and explain the features of object-oriented programming. 10M

OR

14. B). What is inheritance list different types of inheritance with code snippets? 10M

15. A). Why GUI is powerful explain using tkinter module? 10M

OR

15. B). Discuss about turtle Graphics with an example. 10M

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H.T No: | | | | | | | | | | | R18 | Course Code: A30554

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: JAVA PROGRAMMING

(Common for EEE & ECE)

Date: 04.03.2023 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. Size of the int and double variable in Java. 2 M
2. Where we use "this" keyword in Java Programming? 2 M
3. How to make a possibility of Multiple Inheritance in Java? 2 M
4. How to call Inner Class Method with example? 2 M
5. Wrapper classes can convert into data type? if yes, give the example. 2 M
6. Where "throws" keyword used in Java? 2 M
7. What is the purpose of Thread in Java? 2 M
8. List the two ways of implementing thread in Java. 2 M
9. Which of the class is used to read characters and strings in Java from console? 2 M
10. What is System. error in java? 2 M

PART-B

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

11.A). Build Program for Constructor over loading and Method Over loading in single file(program). 10M

OR

11. B). What is Type Conversion and Casting? Brief explain with example. 10M

12. A). Command line argument, values can be used as Parameters/Variables? Justify with example? 10M

OR

12. B). What is method Overriding? Explain the concepts of method overriding and over loading with example. 10M

13. A). Different Methods in String Class, explain with suitable example. 10M

OR

13. B). What is Exception. How to create User defined Exception with example? 10M

14. A). Explain Lifecycle of the Thread. 10M

OR

14. B). What is Java Thread Priorities with example? 10M

15. A). Write program for to read and write a file using Stream classes. 10M

OR

15. B). Discuss Java Random Access File in JavaIO with sample example. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30230**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: CONTROL ENGINEERING

(Electronics & Communication Engineering)

Date: 08.03.2023 AN **Time: 3 hours** **Max.Marks: 70**

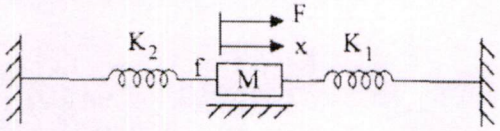
(Note: Assume suitable data if necessary)

PART-A

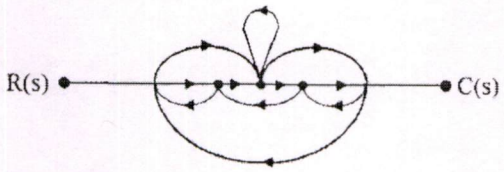
Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

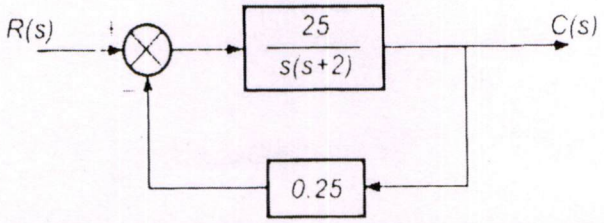
1. Mention the differences between Open-loop and closed-loop control systems. 2 M
2. Write the transfer function of the mass-spring-friction system, where K1, K2 –Spring Constants, f-Friction, M-Mass, F- Force and x-displacement. 2 M



3. Find the number of forward paths in the signal flow of a system given below. 2 M



4. Differentiate between A.C and D.C servo motor 2 M
5. Given unity feedback system with $G(s) = \frac{K}{s(s+4)}$. Find the value of K for damping ratio of 0.5. 2 M
6. Determine the sensitivity of the closed-loop system shown in figure at ω = 1 rad/sec w.r.t. forward path transfer function. 2 M



7. In a Bode plot of a unity feedback control system, the value of phase of G(jω) at the gain cross-over frequency is -125°. Calculate the phase margin. 2 M
8. In the transfer function $G(s) = \frac{K}{s(1+sT)}$ if K is negative, then what would be its contribution to the phase plot? 2 M
9. If $\varphi(t)$ is the state transition matrix, then determine $\varphi^{-1}(t)$. 2 M
10. Write any two properties of state transition matrix. 2 M

(P.T.O..)

PART-B

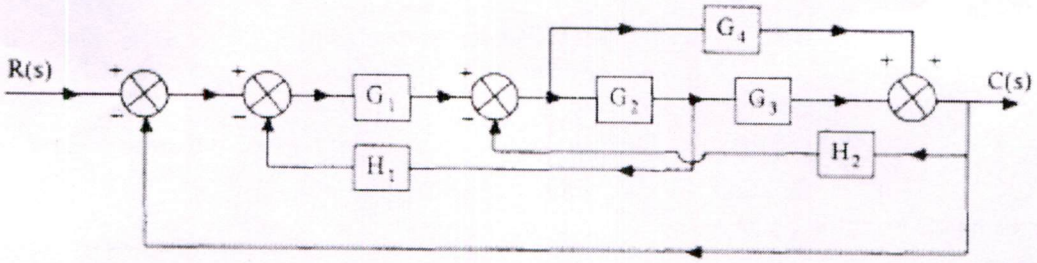
Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Explain the classification of the Control systems. 10M

OR

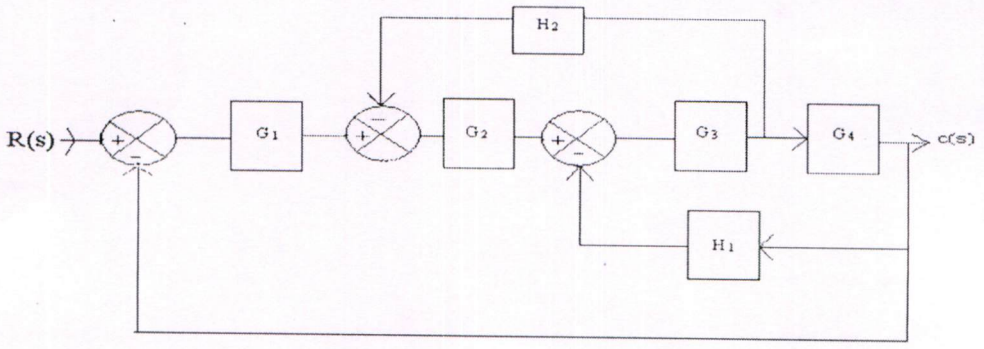
11. B). Explain the feedback effects in closed-loop control systems. 10M

12. A). Draw the signal flow graph for the given block diagram and obtain the transfer function by using Mason's Gain formula. 10M



OR

12. B). Determine the overall transfer function C(s)/R(s) for the system shown in figure using block diagram reduction rules by drawing a separate block diagram in each step. 10M



13. A). i) Obtain the response of a unity feedback system whose open loop transfer function is $G(s) = \frac{3}{s(s+4)}$ for a unit – step input. 5M

ii) Determine the range of K for the system to be stable $S^4+20KS^3+5S^2+10s+15 = 0$ 5M

OR

13. B). Sketch the root locus for the open loop transfer function of unity feedback control system $G(s)H(s) = \frac{K}{s(s+2)(s+4)}$. 10M

14. A). Construct the Bode plots for a unity feedback system whose open loop transfer function is given by $G(s) = \frac{10}{s(1+s)(1+0.02s)}$. From the Bode plots determine: Gain and phase cross over frequencies. 10M

OR

14. B). Obtain the Nyquist plot for the given open-loop transfer function. 10M

$$G(s) = \frac{K}{(s+1)(s-2)}$$

(P.T.O..)

15. A). Check the observability and controllability of the system described by 10M

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ -1 \end{bmatrix} u, \qquad y = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

OR

15. B). Find the solution for the state equation of a system described by 10M

$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ when it is subjected to a unit step input (u(t)) with initial condition $X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

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