CBCS SCHEME

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15MAT41

Fourth Semester B.E. Degree Examination, June/July 2019
Engineering Mathematics – IV

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Employ Taylor's series method, find y(0.1) considering upto third degree term if y(x) satisfies the equation $\frac{dy}{dx} = x - y^2$, y(0) = 1. **(05 Marks)**

b. Using Runge-Kutta method of fourth order, find y(0.1) for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, y(0) = 1 taking h = 0.1. **(05 Marks)**

c. Apply Milne's method to compute y(1.4) correct to four decimal places given $\frac{dy}{dx} = x^2 + \frac{y}{2}$ and following the data : y(1) = 2, y(1.1) = 2.2156, y(1.2) = 2.4649, y(1.3) = 2.7514. **(06 Marks)**

OR

2 a. Use Taylor's series method to find y(4.1) given that $(x^2 + y)y' = 1$ and y(4) = 4. **(05 Marks)**

b. Find y at x = 0.8, given $y' = x - y^2$ and y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762. Using Adams – Bashforth method. Apply the corrector formula. **(05 Marks)**

c. Using Modified Euler's method find y at x = 0.1 given $y' = 3x + \frac{y}{2}$ with y(0) = 1 taking h = 0.1. **(06 Marks)**

Module-2

3 a. Obtain the solution of the equation $2y'' = 4x + y'$ with initial conditions y(1) = 2, y(1.1) = 2.2156, y(1.2) = 2.4649, y(1.3) = 2.7514 and y'(1) = 2, y'(1.1) = 2.3178, y'(1.2) = 2.6725, y'(1.3) = 3.0657 by computing y(1.4) applying Milne's method. **(05 Marks)**

b. If α and β are two distinct roots of $J_n(x) = 0$ then prove that $\int_0^1 x J_n(\alpha x) J_n(\beta x) dx = 0$ if $\alpha \neq \beta$. **(05 Marks)**

c. Show that $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \cos x$ **(06 Marks)**

OR

4 a. Given $y'' - xy' - y = 0$ with the initial conditions y(0) = 1, y'(0) = 0. Compute y(0.2) and y'(0.2) by taking h = 0.2 using Runge - Kutta method of fourth order. **(05 Marks)**

b. If $x^3 + 2x^2 - x + 1 = aP_0(x) + bP_1(x) + cP_2(x) + dP_3(x)$ then, find the values of a, b, c, d. **(05 Marks)**

c. Derive Rodrigue's formula

$$P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n}\left[(x^2 - 1)^n\right]$$ **(06 Marks)**

Module-3

5 a. State and prove Cauchy-Reimann equation in polar form. **(05 Marks)**

b. Discuss the transformation $w = z^2$. **(05 Marks)**

c. Find the bilinear transformation which maps the points $z = 1, i, -1$ into $w = 2, i, -2$. **(06 Marks)**

OR

6 a. Find the analytic function whose real part is

$$\frac{x^4 - y^4 - 2x}{x^2 + y^2}$$ **(05 Marks)**

b. State and prove Cauchy Integral formula. **(05 Marks)**

c. Evaluate $\int_c \frac{e^{2z}}{(z+1)(z-2)} dz$ where c is the circle : $|z| = 3$ using Cauchy's Residue theorem. **(06 Marks)**

Module-4

7 a. The probability function of a variate x is :

x	0	1	2	3	4	5	6	7
p(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

(i) Find k (ii) Evaluate $p(x < 6)$, $p(x \geq 6)$ and $p(3 < x \leq 6)$. **(05 Marks)**

b. Obtain mean and standard deviation of Binomial distribution. **(05 Marks)**

c. The joint distribution of two discrete variables x and y is $f(x, y) = (2x + y)$ where x and y are integers such that $0 \leq x \leq 2$; $0 \leq y \leq 3$.

Find : (i) Marginal distribution of x and y.

(ii) Are x and y independent. **(06 Marks)**

OR

8 a. The marks of 1000 students in an examination follows a normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be

(i) less than 65 (ii) more than 75 (iii) between 65 and 75 [Given $\phi(1) = 0.3413$] **(05 Marks)**

b. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals, more than two will get a bad reaction. **(05 Marks)**

c. The joint distribution of the random variables X and Y are given. Find the corresponding marginal distribution. Also compute the covariance and the correlation of the random variables X and Y. **(06 Marks)**

X \ Y	1	3	9
2	1/8	1/24	1/12
4	1/4	1/4	0
6	1/8	1/24	1/12

Module-5

9 a. Explain the terms: (i) Null hypothesis (ii) type-I and type-II errors (iii) Significance level **(05 Marks)**

b. In 324 throws of a six faced 'die', an odd number turned up 181 times. Is it reasonable to think that 'die' is an unbiased one? **(05 Marks)**

c. Three boys A, B, C are throwing ball to each other. A always throws the ball to B and B always throws the ball to C. C is just as likely to throw the ball to B as to A. If C was the first person to throw the ball find the probabilities that after three throws (i) A has the ball (ii) B has the ball (iii) C has the ball. **(06 Marks)**

OR

10 a. Find the unique fixed probability vector for the matrix

$$P = \begin{bmatrix} 0 & 2/3 & 1/3 \\ 1/2 & 0 & 1/2 \\ 1/2 & 1/2 & 0 \end{bmatrix}$$ **(05 Marks)**

b. A random sample for 1000 workers in company has mean wage of Rs. 50 per day and standard deviation of Rs. 15. Another sample of 1500 workers from another company has mean wage of Rs. 45 per day and standard deviation of Rs. 20. Does the mean rate of wages varies between the two companies? **(05 Marks)**

c. A die is thrown 264 times and the number appearing on the face (x) follows the following frequency distribution.

x	1	2	3	4	5	6
f	40	32	28	58	54	60

Calculate the value of χ^2. **(06 Marks)**

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CBCS SCHEME

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15EC42

Fourth Semester B.E. Degree Examination, June/July 2019
Microprocessor

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the internal architecture of 8086 with its neat block diagram. **(08 Marks)**

b. Explain any four addressing modes of 8086 microprocessor with an example each. **(08 Marks)**

OR

2 a. Write a program to exchange of two block of data from 5000H to 6000H memory locations. **(08 Marks)**

b. Explain any three conditional branch instructions with example. **(03 Marks)**

c. Explain the flag register of 8086. **(05 Marks)**

Module-2

3 a. Explain any four Assembler directives with one example each. **(08 Marks)**

b. Write an ALP to reverse the string "MY INDIA" and store in memory location STR2. **(08 Marks)**

OR

4 a. Explain the following instructions with example each.
(i) RCL (ii) SAR (iii) TEST (iv) LOOPZ. **(08 Marks)**

b. What are the machine control instructions? Explain any 3 instructions. **(06 Marks)**

c. What is the difference between IRET and RET? **(02 Marks)**

Module-3

5 a. What is stack? Explain the stack operation for PUSH and POP instruction of 8086 with neat diagram. **(08 Marks)**

b. Define a macro. Write a program using macro to display a message. **(04 Marks)**

c. Write a delay program to generate a delay of 0.1 sec, using an 8086 system operating at 10 MHz. **(04 Marks)**

OR

6 a. Define Interrupts. Explain TYPE0 and TYPE2 Interrupts. **(06 Marks)**

b. Explain hardware interrupts of 8086 microprocessor. Explain maskable and NMInterrupts. **(06 Marks)**

c. Bring out the differences between MACRO and procedure. **(04 Marks)**

Module-4

7 a. Sketch the maximum mode configuration of 8086 and explain the operation briefly. **(08 Marks)**

b. Interface a 4×4 keyboard to 8086 and write the program logic flow. **(08 Marks)**

OR

8 a. Interface a multiplexed 7-segment display to 8086 and explain. **(08 Marks)**

b. With a neat diagram, explain 8255 PPI device and also explain control register of 8255. **(08 Marks)**

Module-5

9 a. With a neat diagram explain the interfacing of 1.8° step stepper motor and also write clockwise rotation program for 100 steps assuming 'DELAY' procedure is available. **(08 Marks)**

b. Write interfacing diagram of DAC AD7523 with an 8086 CPU. Write an ALP to generate Sawtooth waveform. **(08 Marks)**

OR

10 a. With a neat diagram explain the 8087 coprocessor. **(08 Marks)**

b. Explain with a neat diagram of 8254 internal architecture. **(08 Marks)**

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15EC42

Fourth Semester B.E. Degree Examination, June/July 2019
Microprocessor

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the internal architecture of 8086 with its neat block diagram. **(08 Marks)**

b. Explain any four addressing modes of 8086 microprocessor with an example each. **(08 Marks)**

OR

2 a. Write a program to exchange of two block of data from 5000H to 6000H memory locations. **(08 Marks)**

b. Explain any three conditional branch instructions with example. **(03 Marks)**

c. Explain the flag register of 8086. **(05 Marks)**

Module-2

3 a. Explain any four Assembler directives with one example each. **(08 Marks)**

b. Write an ALP to reverse the string "MY INDIA" and store in memory location STR2. **(08 Marks)**

OR

4 a. Explain the following instructions with example each.
(i) RCL (ii) SAR (iii) TEST (iv) LOOPZ. **(08 Marks)**

b. What are the machine control instructions? Explain any 3 instructions. **(06 Marks)**

c. What is the difference between IRET and RET? **(02 Marks)**

Module-3

5 a. What is stack? Explain the stack operation for PUSH and POP instruction of 8086 with neat diagram. **(08 Marks)**

b. Define a macro. Write a program using macro to display a message. **(04 Marks)**

c. Write a delay program to generate a delay of 0.1 sec, using an 8086 system operating at 10 MHz. **(04 Marks)**

OR

6 a. Define Interrupts. Explain TYPE0 and TYPE2 Interrupts. **(06 Marks)**

b. Explain hardware interrupts of 8086 microprocessor. Explain maskable and NMInterrupts. **(06 Marks)**

c. Bring out the differences between MACRO and procedure. **(04 Marks)**

Module-4

7 a. Sketch the maximum mode configuration of 8086 and explain the operation briefly. **(08 Marks)**

b. Interface a 4×4 keyboard to 8086 and write the program logic flow. **(08 Marks)**

OR

8 a. Interface a multiplexed 7-segment display to 8086 and explain. **(08 Marks)**

b. With a neat diagram, explain 8255 PPI device and also explain control register of 8255. **(08 Marks)**

Module-5

9 a. With a neat diagram explain the interfacing of 1.8° step stepper motor and also write clockwise rotation program for 100 steps assuming 'DELAY' procedure is available. **(08 Marks)**

b. Write interfacing diagram of DAC AD7523 with an 8086 CPU. Write an ALP to generate Sawtooth waveform. **(08 Marks)**

OR

10 a. With a neat diagram explain the 8087 coprocessor. **(08 Marks)**

b. Explain with a neat diagram of 8254 internal architecture. **(08 Marks)**

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15EC43

Fourth Semester B.E. Degree Examination, June/July 2019
Control Systems

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define a control system. Explain the difference between open loop and closed loop control system with example for each. **(06 Marks)**

b. Determine the transfer function $X_2(s)/F(s)$ for the mechanical system shown in Fig.Q.1(b) **(08 Marks)**

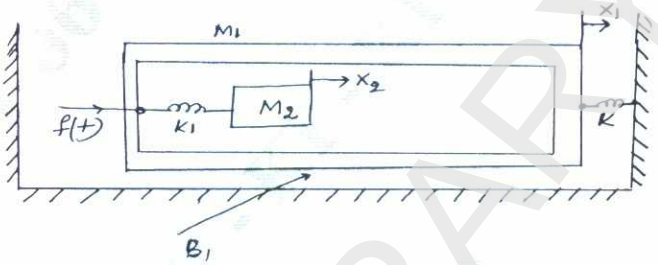

Fig.Q.1(b)

c. State advantages of the block diagram reduction technique. **(02 Marks)**

OR

2 a. Explain the block diagram reduction rules. **(04 Marks)**

b. Obtain C(s)/R(s) using block diagram reduction rules for the Fig.Q.2(b). **(06 Marks)**

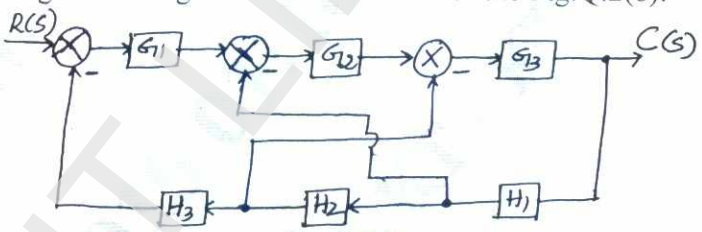

Fig.Q.2(b)

c. Using Mason's gain formula, find the gain of the system in Fig.Q.2(c). **(06 Marks)**

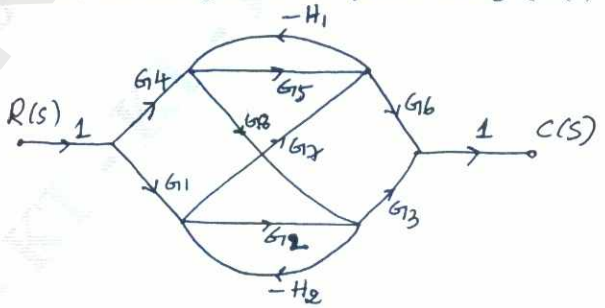

Fig.Q.2(c)

Module-2

3 a. What are disadvantages of static error coefficient method? **(03 Marks)**

b. Find k_p, k_v, k_a and static error for a system with open loop transfer function as:

$$G(s)H(s) = \frac{10(s+2)(s+3)}{s(s+1)(s+5)(s+4)}$$ where the input is $r(t) = 3 + t + t^2$. **(05 Marks)**

c. Derive the expression of unit step response of a second order system (under damped case). **(08 Marks)**

OR

4 a. Derive the expressions for Peak Time (T_P), Peak over short (M_P), Rise Time (T_R) and Settling Time (T_S). **(08 Marks)**

b. For a spring mass damper shown in Fig.Q.4(b) (i), an experiment was conducted by applying a force of 2 Newton's to the mass. The response X(t) was recorded using an xy plotter and the experimental result are shown in Fig.Q.4(b) (ii). Find the value of M, K and B. **(08 Marks)**

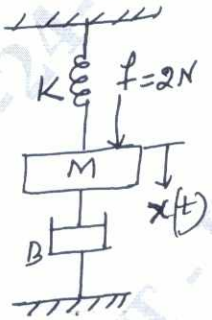

Fig.Q.4(b) (i)

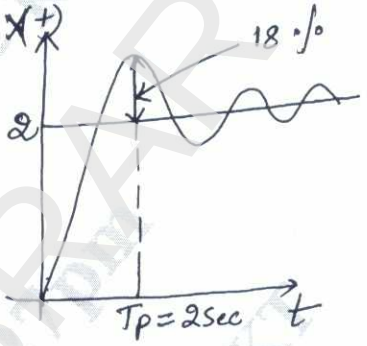

Fig.Q.4(b) (ii)

Module-3

5 a. State and explain Routh-Hurmitz criterion of stability. What are limitations? **(05 Marks)**

b. A unity feedback control system has $G(s) = \frac{K(s+13)}{s(s+3)(s+7)}$, using Routh's criterion calculate the range of K for which the system is i) stable ii) has its closed loop, poles more negative than -1. **(08 Marks)**

c. Define absolute stability and marginal stability. **(03 Marks)**

OR

6 a. State the rules for the construction of root loci of the characteristic equation of a feedback control system. **(04 Marks)**

b. Draw the root locus diagram for the loop transfer function:

$$G(s)H(s) = \frac{K}{s(s^2+8s+17)}$$

From the diagram, evaluate the value of K for a system damping ratio of 0.5. **(12 Marks)**

Module-4

7 a. Explain the correlation between time and frequency time for second order system. **(06 Marks)**

b. A unity feedback control system has $G(s) = \frac{80}{s(s+2)(s+20)}$. Draw the bode plot. **(10 Marks)**

OR

8 a. Distinguish between gain margin and phase margin. **(04 Marks)**

b. Draw the complete Nyquist plot of the system whose loop transfer function is given by $G(s) = \frac{10}{s^2(s+0.25s)(1+0.5s)}$. And hence determine system is stable or not. **(12 Marks)**

Module-5

9 a. Define state variables and state transition matrix. List the properties of the state transition matrix. **(06 Marks)**

b. For a certain system, when $X(0) = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$ then $X(t) = \begin{bmatrix} e^{-3t} \\ -3e^{-3t} \end{bmatrix}$ while $X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ then $X(t) = \begin{bmatrix} e^{t} \\ e^{t} \end{bmatrix}$. Determine the system matrix A. Also find state transition matrix. **(10 Marks)**

OR

10 a. Obtain the state model for the electrical system as shown in the Fig.Q.10(a), choosing the state variables as $i_1(t)$, $i_2(t)$ and $v_c(t)$. **(06 Marks)**

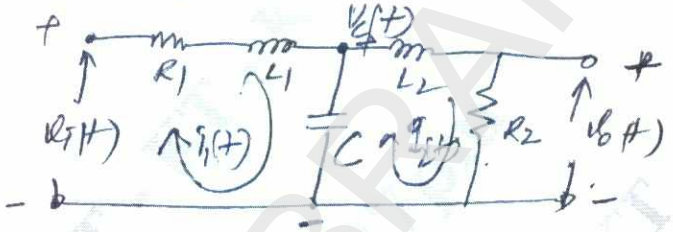

Fig.Q.10(a)

b. State and prove sampling theorem for low pass signals. **(10 Marks)**

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15EC44

Fourth Semester B.E. Degree Examination, June/July 2019
Signals and Systems

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Find the odd part and even part of the signal given in Fig.Q1(a). **(08 Marks)**

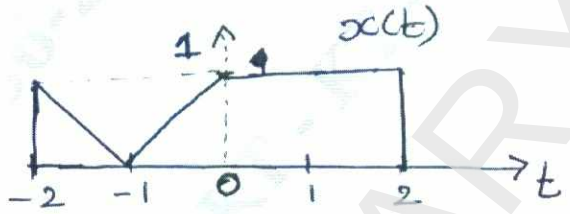

Fig.Q1(a)

b. Find 4x(–3n + 4), if x(n) is as shown in Fig.Q1(b). **(04 Marks)**

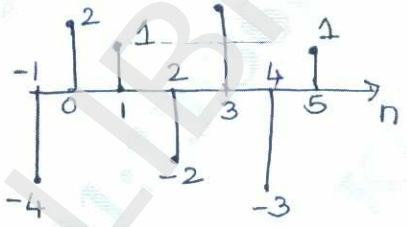

Fig.Q1(b)

c. Find whether the signal is causal, linear, time variant and static for all values of 'n'. $y(n) = x(-3n)$. **(04 Marks)**

OR

2 a. Find whether the given signal is periodic and if periodic, determine the period :

$$x(t) = a\cos(\sqrt{2}t) + b\sin\left(\frac{t}{4}\right).$$ **(04 Marks)**

b. Sketch the following signal $x(t) = r(t+1) - r(t-1) + 2r(-3)$. **(05 Marks)**

c. Find $y(-t-2)\cdot x\left(\frac{t}{2}+1\right)$ if y(t) and x(t) are as shown in FigQ2(c). **(07 Marks)**

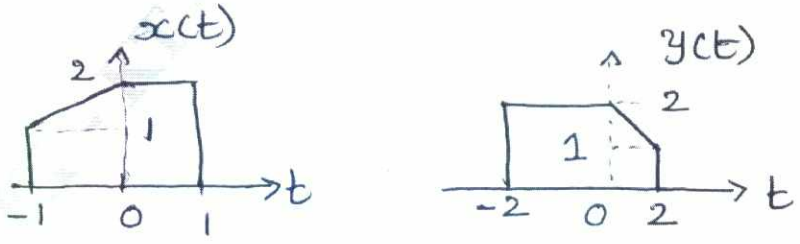

Fig.Q2(c)

Module-2

3 a. Make use of graphical method to perform the convolution of two signals $x_1(n)$ and $x_2(n)$ given : $x_1(n) = \{1, \underset{\uparrow}{2}, 3, 4\}$ and $x_2(n) = \{-2, \underset{\uparrow}{0}, 2\}$. **(08 Marks)**

b. Find $x_1(t) * x_2(t)$ if

$$x_1(t) \begin{cases} e^{-t}; & 0 \le t \le 1 \\ 0; & \text{otherwise} \end{cases}$$

$$x_2(t) \begin{cases} 2; & 0 \le t \le 2 \\ 0; & \text{otherwise} \end{cases}.$$ **(08 Marks)**

OR

4 a. Find $x_1(t) * x_2(t)$ if

$$x_1(t) \begin{cases} 1; & 0 \le t \le 2 \\ 0; & \text{otherwise} \end{cases}$$

$$x_2(t) \begin{cases} t; & 0 \le t \le 1 \\ 0; & \text{otherwise} \end{cases}.$$ **(08 Marks)**

b. Find the convolution of $x_1(n)$ and $x_2(n)$ if $x_1(n) = a^n u(n)$ $x_2(n) = b^n u(-n)$. **(08 Marks)**

Module-3

5 a. Define the following properties of DTFS :
i) Convolution ii) Periodicity iii) Linearity **(06 Marks)**

b. Find the complex exponential Fourier series for the periodic rectangular pulse train shown in Fig.Q5(b). **(10 Marks)**

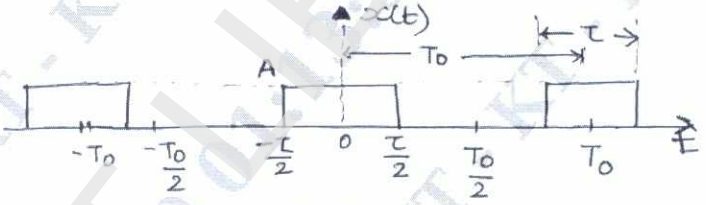

Fig.Q5(b)

OR

6 a. Find the DTFS coefficients of the signal shown in Fig.Q6(a). **(10 Marks)**

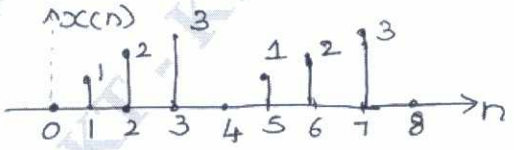

Fig.Q6(a)

b. Find an expression for impulse response of interconnection of LTI systems shown in Fig. Q6(b). **(06 Marks)**

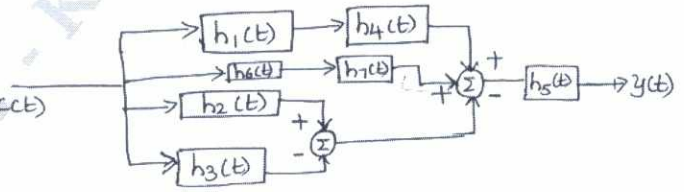

Fig.Q6(b)

Module-4

7 a. Construct the Fourier transform of rectangular pulse shown in Fig.7(a). Also obtain and plot magnitude and phase responses. **(08 Marks)**

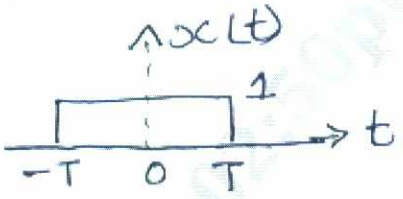

Fig.Q7(a)

b. Define and prove the following properties of DTFT i) frequency shift ii) time reversal. **(08 Marks)**

OR

8 a. Explain sampling theorem and the concept of aliasing. **(04 Marks)**

b. Find DTFT of the signal, $x(n) = -a^n u(-n-1)$. **(04 Marks)**

c. Find Fourier transform of the following signals.

i) $x(t) = e^{-a|t|}$ ii) $x(t) = e^{at}u(-t)$. **(08 Marks)**

Module-5

9 a. Explain the properties of RoC. **(06 Marks)**

b. The system function of the LTI is given as $H(z) = \frac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}$. Specify the RoC of H(z) and determine the unit sample response h(n) for the following conditions :

i) Stable system
ii) Causal system
iii) Anticausal system. Also determine poles and zeroes of H(z). **(10 Marks)**

OR

10 a. Find Z-transform of x(n) = nu(n-1). **(06 Marks)**

b. Find inverse z-transform if $X(z) = \frac{z}{(z^2+z+0.5)(z-1)}$. **(10 Marks)**

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CBCS SCHEME

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15EC45

Fourth Semester B.E. Degree Examination, June/July 2019
Principles of Communication Systems

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the generation of DSB-SC wave using ring modulator. **(06 Marks)**

b. Explain briefly on the following :
i) Frequency discrimination method
ii) Phase discrimination method for SSB generation. **(06 Marks)**

c. A broadcast transmitter radiates 20 kilowatts when the modulation percentage is 75. How much of this is carrier power? Also calculate the power of each sidebands. **(04 Marks)**

OR

2 a. Explain the working of envelope detector. **(06 Marks)**

b. With a neat block diagram. What a note on quadrature carrier multiplexing. **(06 Marks)**

c. Explain how costas receivers can be used for demodulating the DSB – SC signal. **(04 Marks)**

Module-2

3 a. Define angle modulation and explain important advantages of modulated waves. **(06 Marks)**

b. With a block diagram. Explain the working of a FM stereo multiplexing. **(06 Marks)**

c. A sinusoidal modulating wave of amplitude 5V and frequency 1KHz is applied to a frequency modulator. The frequency sensitivity of the modulator is 50 and calculate :
i) The frequency deviation ii) Modulation index. **(04 Marks)**

OR

4 a. Explain narrowband frequency modulation. **(05 Marks)**

b. Explain nonlinearity and its effect in frequency modulation system. **(05 Marks)**

c. Explain the linear model of phase locked loop with relevant expression. **(06 Marks)**

Module-3

5 a. Explain the following terms :
i) Moments ii) central moments iii) mean iv) covarience. **(08 Marks)**

b. Explain the properties of joint distribution function. **(04 Marks)**

c. The random variable 'y' is the function of another random variable 'X' such that $y = \cos(X)$ and 'X' is uniformly distributed in the interval $(-\pi, \pi)$ i.e.,

$f_x(x) = 1/2\pi \quad -\pi < x < \pi$

$= 0 \quad$ othwerise

Find out the mean value of 'y'. **(04 Marks)**

OR

6 a. Explain the following of their properties :
i) Autocorrelation function
ii) Cross circulation function. **(05 Marks)**

b. Explain briefly about sources of noise. Explain thermal noise. **(06 Marks)**

c. Define and derive noise equivalent bandwidth, and also calculate the mean square noise across capacitor. **(05 Marks)**

Module-4

7 a. With neat diagram, explain about AM noise receiver and obtain the figure of merit. **(08 Marks)**

b. With neat diagram, explain a DSB–SC receiver using coherent detection. Show that figure of merits for such receiver is unity. **(08 Marks)**

OR

8 a. Find the figure of merit when the depth of modulation of AM system when :
i) 100% ii) 50% iii) 30%. **(06 Marks)**

b. Explain the pre-emphasis and de-emphasis in frequency modulation with circuit and graph. **(06 Marks)**

c. Write short notes on capture effect. **(04 Marks)**

Module-5

9 a. Give the comparison of analog signals and digital signals use in communication system. **(04 Marks)**

b. With neat block diagram, explain the generation of PAM waves. **(06 Marks)**

c. With neat diagram, explain concept of time division multiplexing. **(06 Marks)**

OR

10 a. With diagram, explain the generation of PPM waves. **(08 Marks)**

b. Explain channel vocoder with its neat diagram. **(08 Marks)**

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CBCS SCHEME

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17EC46

Fourth Semester B.E. Degree Examination, June/July 2019
Microprocessors

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Why multiplexing technique is used in 8086? Mention its advantages. **(05 Marks)**

b. Explain the internal architecture of Intel 8086 with neat block diagram and explain in brief. **(10 Marks)**

c. Analyze the effective and physical address if :
i. Disp = 1B57H, DS = 2100H
ii. DI = 1045H, DS = 2100H
iii. BP = 8000H, DS = 5000H, SS = 1000H, Disp = 2345H
iv. BX = 0158H, SI = 1045H, DS = 2100H, SS = 1400H
v. BP = 0720H, Disp = 1000H, DS = 2000H, SS = 4000H. **(05 Marks)**

OR

2 a. List the need of control word register of Intel 8086. Explain with an example. **(08 Marks)**

b. What is addressing modes? Explain any four addressing modes with an example to each. **(08 Marks)**

c. Interpret the following instructions : i) SUB and CMP ii) AND and TEST. **(04 Marks)**

Module-2

3 a. Identify the operation of the following instructions :
i) NEG ii) CBW iii) DAA iv) AAD v) SAHF. **(05 Marks)**

b. Write ALP to move 16 bytes of string of data from the offset 0200H to 0300H. **(10 Marks)**

c. What are assembler directions? Explain the following assembler directions.
i) Model ii) Assume iii) DB iv) DUP v) END. **(05 Marks)**

OR

4 a. Tell the functions of the following instructions with an example :
i) ROL ii) RCR iii) SHL iv) SAR v) ROR. **(10 Marks)**

b. Write ALP to convert 8 digits packed BCD number to 16 digits unpacked BCD number. **(10 Marks)**

Module-3

5 a. Explain the operation of the stack using PUSH and POP instructions. **(05 Marks)**

b. Write ALP to find the factorial of an 8-bit number. **(10 Marks)**

c. Interpret the maskable and non–maskable interrupts of 8086. **(05 Marks)**

OR

6 a. Write ALP to generate a delay of 100ms using an 8086 system that runs on 10MHz frequency. **(10 Marks)**

b. Analyze the interrupt cycle of 8086. **(10 Marks)**

Module-4

7 a. Draw the pin configuration of Intel 8086 and explain the operation of pins in maximum mode of operation. **(10 Marks)**

b. Interface two 4K × 8 EPROM and two 4K × 8 RAM chips with 8086. Show the memory mapping. **(10 Marks)**

OR

8 a. Show the block diagram of Intel 8255 and explain the operation of each unit in detail. **(10 Marks)**

b. Interface 8 seven segment display using 8255 with 8086. Write ALP to display 1, 2, 3, 4, 5, 6, 7, 8 over the 8 seven segment display continuously. **(10 Marks)**

Module-5

9 a. Interface 8 bit ADC 0808 through 8255 to 8086. Write ALP to accept the channel number through key board ($O_0 - 0_7$), convert analog i/p of selected channel to digital o/p and store the result as a digital data. **(10 Marks)**

b. Design a stepper motor controller and write ALP to rotate shaft of 4-phase stepper motor.
i) In clockwise 5 rotations ii) In anticlockwise 5 rotations. **(10 Marks)**

OR

10 a. Interpret the following INT 21H dos function. I) function 09H ii) function 4CH. **(08 Marks)**

b. Write ALP to generate a square waveform using DAC 0800 through 8255 to 8086. **(12 Marks)**

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15MATDIP41

Fourth Semester B.E. Degree Examination, June/July 2019
Additional Mathematics – II

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ by elementary row operation. **(06 Marks)**

b. Find the inverse of the matrix $\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix}$ using Cayley - Hamilton theorem. **(05 Marks)**

c. Find all eigen values of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ **(05 Marks)**

OR

2 a. Solve the system of equation by Gauss - Elimination method.

$x + y + z = 9$
$x - 2y + 3z = 8$
$2x + y - z = 3$ **(06 Marks)**

b. Using Cayley – Hamilton theorem find A^{-1}, given $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ **(05 Marks)**

c. Reduce the matrix $A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ into row echelon form and hence find its rank. **(05 Marks)**

Module-2

3 a. Solve by the method of undetermined co-efficient $y'' - 4y' + 4y = e^x$. **(06 Marks)**

b. Solve $(D^3 + 6D^2 + 11D + 6)y = 0$. **(05 Marks)**

c. Solve $y'' + 2y' + y = 2x$. **(05 Marks)**

OR

4 a. Solve by the method of variation of parameter $y'' + a^2y = \sec ax$. **(06 Marks)**

b. Solve $y'' - 4y' + 13y = \cos 2x$. **(05 Marks)**

c. Solve $(D^2 - 1)y = e^{2x}$. **(05 Marks)**

Module-3

5 a. If $f(t) = t^2$, $0 < t < 2$ and $f(t+2) = f(t)$ for $t > 2$, find $L[f(t)]$. **(06 Marks)**

b. Find $L[\cos t \cdot \cos 2t \cdot \cos 3t]$ **(05 Marks)**

c. Find $L[e^{-2t}(2\cos 5t - \sin 5t)]$ **(05 Marks)**

OR

6 a. Find $L[e^{-t} \cdot \cos^2 3t]$ **(06 Marks)**

b. Express the following function into unit step function and hence find $L[f(t)]$ given

$$f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$$ **(05 Marks)**

c. Find $L[t \cdot \cos at]$ **(05 Marks)**

Module-4

7 a. Using Laplace transforms solve the differential equation $y'' + 4y' + 4y = e^{-t}$ given $y(0) = 0$, $y'(0) = 0$. **(06 Marks)**

b. Find $L^{-1}\left[\frac{2s-5}{4s^2+25}\right] + L^{-1}\left[\frac{8-6s}{16s^2+9}\right]$ **(05 Marks)**

c. Find $L^{-1}\left[\frac{1}{s(s+1)(s+2)(s+3)}\right]$ **(05 Marks)**

OR

8 a. Employ Laplace transform to solve the equation

$y'' + 5y' + 6y = 5e^{2x}$, $y(0) = 2$, $y'(0) = 1$. **(06 Marks)**

b. Find $L^{-1}\left[\frac{s+5}{s^2-6s+13}\right]$ **(05 Marks)**

c. Find $L^{-1}\left[\log\left(\frac{s+a}{s+b}\right)\right]$ **(05 Marks)**

Module-5

9 a. If A and B are any two mutually exclusive events of S, then show that

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ **(06 Marks)**

b. Prove the following :

(i) $P(\phi) = 0$ (ii) $P(\overline{A}) = 1 - P(A)$ **(05 Marks)**

c. Three machines A, B and C produce respectively 60%, 30%, 10% of the total number of items of a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item was produced by machine C. **(05 Marks)**

OR

10 a. State and prove Bay's theorem. **(06 Marks)**

b. If A and B are events with $P(A \cup B) = \frac{7}{8}$, $P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{5}{8}$ find $P(A)$, $P(B)$ and $P(A \cap \overline{B})$. **(05 Marks)**

c. A shooter can hit a target in 3 out of 4 shots and another shooter can hit the target in 2 out of 3 shots. Find the probability that the target is being hit.

(i) when both of them try (ii) by only one shooter. **(05 Marks)**

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