Roll No. _____   Total No. of Pages: [3]

3E1206

3E1206

B. Tech. III - Sem. (Main / Back) Exam., February - 2023
Automobile Engineering
3AE2 – 01 Advance Engineering Mathematics - I
AN, AG, AE, CE, CR, EC, EI, ME, MH, PT

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   **[10×2=20]**

All questions are compulsory

Q.1 Find the Laplace transform of -

$$f(t) = \begin{cases} \cos t & 0 < t < 2\pi \\ 0 & t > 2\pi \end{cases}$$

Q.2 What is unit step function?

Q.3 Find the Z-transform of sequences -

$\{u_n\} = \{25, 10, 5, 3, 2, 1, 0, 5\}$ $-3 \leq n \leq 4$

Q.4 Find the inverse Z-transform of $\log\left(\frac{z}{z+1}\right)$ by power series method.

Q.5 State Convolution Theorem for Fourier transform.

/54

Q.6 Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$.

Q.7 Prove $E = 1 + \dfrac{1}{2}\delta^2 + \delta\sqrt{1 + \dfrac{\delta^2}{4}}$.

Q.8 By using Lagrange's formula, find x corresponding to y = 10 of following data -

x	10	15	17	20
y	3	7	11	14

Q.9 Find the first approximation value of x by Newton-Raphson method of $f(x) = xe^x - 2$ upto three decimal places.

Q.10 Write formula of Milne's Predictor Corrector Method.

PART – B

(Analytical/Problem solving questions)   [5×4=20]

Attempt all five questions

Q.1 Find the inverse Laplace transform of $\dfrac{2s^2 - 1}{(s^2+1)(s^2+4)}$.

Q.2 Find Fourier sine and cosine transform of -

$$f(x) = \begin{cases} x & \text{for } 0 < x \le 1 \\ 2 - x & \text{for } 1 < x < 2 \\ 0 & \text{for } x \ge 2 \end{cases}$$

Q.3 If $\bar{u}(z) = \dfrac{2z^2 + 3z + 4}{(z-3)^3}$, $|z| > 3$, then show that $u_1 = 2$, $u_2 = 21$ and $u_3 = 139$.

Q.4 Evaluate $\displaystyle\int_0^1 \dfrac{dx}{1+x^2}$ by using –

(i) Trapezoidal rule

(ii) Simpson 1/3 rule

Q.5 Given $\dfrac{dy}{dx} = x^2 + y$, $y(0) = 1$. Determine y (0.02) and y (0.04) by using modified Euler's method.

Q.6 By using Stirling formula, find u_{32} from the following data -

$u_{20} = 14.035,$ $u_{25} = 13.674,$ $u_{30} = 13.257$

$u_{35} = 12.734$ $u_{40} = 12.089,$ $u_{45} = 11.309$

Q.7 Solve linear difference equation $u_{n+2} + 6u_{n+1} + 9u_n = 2^n$ given $u_0 = 1 = u_1$.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)   [3×10=30]

Attempt any three questions

Q.1 From the following table of values of x and y find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.2 -

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.72	3.32	4.06	4.96	6.05	7.39	9.02

Q.2 If $\frac{dy}{dx} = x + y^2$ use Runge-Kutta method to find an approximate value of y for x = 0.2, given that y = 1 when x = 0. Use Laplace transform to solve.

Q.3 $(D^2 + 9)y = \cos 2t,$ $y(o) = 1,$ $y(\pi/2) = -1$.

Q.4 Obtain the Fourier transform of $f(x) = \begin{cases} x^2 & |x| \le a \\ 0 & |x| > a \end{cases}$. Hence evaluate

$$\int_0^\infty \cos\left(\frac{as}{2}\right) \frac{\left(a^2 s^2 - 2\right)\sin as + 2as \cos as}{s^3}.ds$$

Q.5 Find $Z\{a^{|n|}\}$ and hence find $Z\left\{\left(\frac{1}{2}\right)^{|n|}\right\}$.

3E1101

B. Tech. III - Sem. (Back) Exam., February - 2023
Aeronautical Engineering
3AN2-01 Advanced Engineering Mathematics-I
AE, AG, AN, CE, CR, EC, EI, ME, MH, MI

Time: 3 Hours

Maximum Marks: 120
Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Use of non-programmable scientific calculator is allowed in this paper   2. NIL

PART – A

(Answer should be given up to 25 words only)

All questions are compulsory

[10×2=20]

Q.1 Find the value of $\Delta^3(x^2 - 1)$ if $h = 1$.

Q.2 Write Simpson's one – third rule.

Q.3 Write Adam's predicator – corrector formula.

Q.4 Write the condition for Newton – Raphson method to be convergent.

Q.5 Define function of class A.

Q.6 Find inverse Laplace transform of $\frac{pe^{-ap}}{p^2 - w^2}$, $a > 0$.

Q.7 Define complex Fourier transform.

Q.8 State Convolution Theorem for Fourier transform.

Q.9 Define Z – transform.

Q.10 Find inverse Z – transform of $\frac{z}{z-a}$, $|z| > a$.

PART – B

(Analytical/Problem solving questions)   [5×8=40]

Attempt any five questions

Q.1 Find the value of $\frac{\Delta^2}{E}\sin(x+h) + \frac{\Delta^2\sin(x+h)}{E\sin(x+h)}$.

Q.2 Find first and second derivatives of function f(x) at x = 7.50 from given data –

x	7.47	7.48	7.49	7.50	7.51	7.52	7.53
f(x)	0.193	0.195	0.198	0.201	0.203	0.260	0.208

Q.3 Use Euler's modified method find y at x = 0.1 by taking h = 0.05, given

$$\frac{dy}{dx} = x^2 + y; y(0) = 1.$$

Q.4 Find inverse Laplace transform of $\frac{p^2}{p^4 - 4a^4}$.

Q.5 Solve ordinary differential equation by using Laplace transform $(D^2 + 1) y = t \cos 2t$

Given, $y = 0, \frac{dy}{dt} = 0$ when t = 0.

Q.6 Find the Fourier sine and cosine transform of –

$$f(t) = \begin{cases} t, & 0 < t < 1 \\ 2 - t, & 1 < t < 2 \\ 0, & t > 2 \end{cases}$$

Q.7 Find Z – transform of n^2, $n \geq 0$.

PART – C

Q.1 (a) Use Gauss forward interpolation formula to find f(128) from given data.   [7]

x	120	125	130	135	140
f(x)	49225	48316	47236	45926	44306

   (b) Find the value of integral $\int_{0.2}^{1.4}(\sin x - \log_e x + e^x)\,dx$ using Simpsons 3/8 rule by dividing range into 6 equal parts.   [8]

Q.2 (a) Find real root of equation $x^3 - 3x - 5 = 0$ corrected upto 4 decimal place using Newton–Raphson method.   [7]

   (b) Compute y(1.4), using fourth order Runge–Kutta method with step size h = 0.2 given $\frac{dy}{dt} = \frac{t}{y}$, $y(1) = 2$.   [8]

Q.3 (a) Evaluate Laplace Transform of function $\sin at - at\cos at + \frac{\sin t}{t}$.   [5]

   (b) An infinite long string having one end x = 0 is initially at rest on the x – axis. The end x = 0 undergoes a periodic transverse displacement given by $A_0 \sin \omega t$, t > 0. Find the displacement of any point on the string at any time.   [10]

Q.4 (a) Find the Fourier cosine transform of e^{-t^2}.   [7]

   (b) Find inverse Fourier sine transform of $\frac{p}{1+p^2}$.   [8]

Q.5 Find inverse Z – transform of $F(z) = \frac{1}{(z-2)(z-3)}$ if region of convergence is –

   (a) |z| < 2   [5]

   (b) 2 < |z| < 3   [5]

   (c) |z| > 3   [5]

3E1200

3E1200

B. Tech. III - Sem. (Main / Back) Exam., February - 2023
Artificial Intelligence & Data Science
Managerial Economics and Financial Accounting
Common to all Branches

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   [10×2=20]

All questions are compulsory

Q.1 Define Managerial Economics.

Q.2 Define National Income.

Q.3 What do you mean by Law of Demand?

Q.4 Define price elasticity of demand.

Q.5 Define Production Function.

Q.6 What is opportunity cost?

Q.7 What do you mean by Monopoly?

Q.8 Define Financial Statement Analysis.

Q.9 What is Pay Back Period?

Q.10 Explain Debtors Turnover Ratio.

PART – B

(Analytical/Problem solving questions)   [5×4=20]

Attempt any five questions

Q.1 Distinguish between deductive and inductive methods in Economics.

Q.2 Discuss the various concepts of national income – Gross National Products, Net National Products, Personal Income and Disposable Income.

Q.3 Explain the various methods of demand forecasting.

Q.4 Distinguish between monopolistic competition and perfect competition.

Q.5 Explain the degrees of price elasticity of demand.

Q.6 The following table gives the total cost schedule of the firm. It is also given that the Average Fixed Cost (AFC) at 4 units of output is ₹ 5.

Quantity (Q)	Total Cost (TC)
1	50
2	65
3	75
4	95
5	130
6	185

Find the Total Variable Cost (TVC) and Total Fixed Cost (TFC) schedules of the firm for the corresponding values of output.

Q.7 Define Balance Sheet. Give two characteristics of balance sheet.

PART – C

Attempt any three questions

Q.1 The following is the Balance Sheet of Riddhima Motors -

Balance Sheet as on 31st March, 2022

Liabilities	₹	Assets	₹
Equity Share Capital	2,00,000	Fixed Assets	4,60,000
Preference Share Capital	1,00,000	Investments (Long Term)	15,000
General Reserve	50,000	Stock	50,000
Profit & Loss Account	70,000	Debtors	20,000
Debentures	1,00,000	Cash	15,000
Creditors	30,000		
Bank Overdraft	10,000		
	5,60,000		5,60,000

Calculate the following ratios :

(a) Current Ratio (b) Liquid Ratio/Quick Ratio (c) Debt Equity Ratio (d) Proprietary Ratio

(e) Solvency Ratio

Q.2 Discuss the nature and scope of Managerial Economics.

Q.3 Explain the Law of Variable Proportions. Explain various stages of this law with the help

of diagram.

Q.4 How the price and output is determined under perfect competition during short period?

Q.5 A company has to select one of the two alternative projects whose particulars are given below -

	Project A (₹)	Project B (₹)
Initial Investment/Initial Outlay	1,18,720	1,00,670
Net cash inflow at the end of the year :		
1	1,00,000	10,000
2	20,000	10,000
3	10,000	20,000
4	10,000	1,00,000

The company can arrange necessary fund at 10%. Compute Net Present Value (NPV) of each project and comment on the result.

The PV factor of ₹ 1 received at the end of each year at 10% discount rate are as follows -

Year	1	2	3	4
10%	0.909	0.826	0.751	0.683

3E1103

3E1103
B. Tech. III - Sem. (Back) Exam., February - 2023
HSMC Aeronautical Engineering
3AN1-03 Managerial Economics & Financial Accounting
All branches

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____

2. NIL _____

PART – A

(Answer should be given up to 25 words only)   [5×2=10]

All questions are compulsory

Q.1 What do you mean by Economic?

Q.2 Define Law of Supply.

Q.3 Define production function.

Q.4 What you mean by perfect competition?

Q.5 What is capital budgeting?

PART – B

(Analytical/Problem solving questions)

[4×10=40]

Attempt any four questions

Q.1   Discuss the scope of Managerial Economics.

Q.2   Explain Law of Demand.

Q.3   Explain the relationship between Average Cost (AC) and Marginal Cost (MC).

Q.4   Distinguish between monopoly and perfect competition.

Q.5   Write five merits and demerits of inductive and deductive methods.

Q.6   Explain the significance of ratio analysis.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

Q.1   Explain the methods of measuring National Income.

Q.2   How the price and output is determined under monopoly during short period?

Q.3   A Ltd. is considering investing in a project requiring a capital outlay of ₹ 1,00,000.

Forecast of annual income after depreciation but before tax is as follows -

Year	1	2	3	4	5
Amount	50,000	50,000	40,000	40,000	20,000

Depreciation may be taken at 20% on original cost and income tax at 50% of net income.
Evaluate the project using pay-back method and Average Rate of Return (ARR).

3E1222

3E1222

B. Tech. III - Sem. (Main / Back) Exam., February - 2023
Electronic Instrumentation & Control Engineering
3EI4 – 04 Digital System Design
EC, EI

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

     Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

     Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

     Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   [10×2=20]

All questions are compulsory

Q.1 Determine the number of bits required to represent in floating point notation the exponent for decimal number in the range of $10^{\pm 86}$.

Q.2 How would an 8-bit microcomputer process this?

$$18,357$$
$$- \underline{12,618}$$
$$?$$

Q.3 Implement using NAND gates only $F = xyz + x'y'$.

Q.4 The input to a 2-input exclusive NOR gate are a variable and its inverse what is the output? Show truth table.

Q.5 Convert Y = A + BC' + AB + A'BC into canonical form.

Q.6 Show that a positive logic NAND gate is a negative logic NOR gate.

Q.7 What is the difference between combinational and sequential circuits?

Q.8 What is the difference between synchronous reset and asynchronous reset?

Q.9 State the differences between Moore and Mealy State Machine.

Q.10 Compare dynamic RAM with static RAM.

PART – B

(Analytical/Problem solving questions) [5×4=20]

Attempt all five questions

Q.1 Implement the following Boolean expression using multiplexer.

Y = A' B C '+ A B' C' D + A' B' D + A' C D

Q.2 Design a Full Substrator using 3:8 decoders.

Q.3 What are the advantages of tabulation method? A staircase light is controlled by two switches, one at top of the stair and another at the bottom of the staircase?

(i) Make a truth table for this system

(ii) Write logic equation

(iii) Realize the circuit using AND-OR Gates

Q.4 Show a block diagram of modulus M counter.

Q.5. With respect to logic gate, explain the following terms: I_{OL}, I_{IL}, I_{OH}, I_{IH}. Specify the value of these parameters for a standard TTL gate.

Q.6 Many cars produced in Japan have an interlock system that allows the engine to start only if both the front seat occupant has their seats belt on. Construct a truth table to indicate whether the car may be started based upon whether a passenger is present and whether both passenger and the driver buckled their seat belt.

Q.7 What is FPGA? Draw the architecture of FPGA.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)   [3×10=30]

Attempt any three questions

Q.1 (a) A digital system has a 4-bit input from 0000 to 1111. Design a logic circuit that produces a high output whenever the equivalent decimal input is greater than 13.

(b) Design the logic diagram of a circuit for addition/substration. Use a control variable w and a circuit that functions as a full adder when w = 0, as a full substrator when w = 1.

Q.2 Design the following –

(a) 10 × 1K decoder using 8 × 256 decoder and additional logics

(b) 32: 1 MUX using two 16:1 MUX's, one 2:1 MUX

(c) Explain briefly the systematic procedure for using doesn't care condition. Define multilevel logic circuit with diagram.

Q.3 (a) Toggle Flip-flop, popularly known as T flip-flop has following input- output relation. When input T = 0, the output φ does not change its state. For T = 1, the output φ toggles its value. Derive & implement the T flip-flop from JK flip-flop.

(b) Design a sequence detector to detect a serial input sequence 1010. Draw its state diagram, state table, state assignment table and final implementation circuit.

Q.4 (a) Which bipolar family is best suited for LSI?

(i) Show the circuit of a 4-input NAND gate using CMOS transistor

(ii) Repeat for a 4-input NOR gate

(b) Compare the characteristics of different logic families.

Q.5 (a) Explain and represent graphically the VLSI design flow using top down design. What is the role of simulation?

(b) Discuss the requirement that led to the design of the VHDL language, which of these requirements where a software language would fall short in describing hardware.

3E1225

3E1225

3E1225

B. Tech. III - Sem. (Main/Back) Exam., February - 2023
Electronic Inst. & Control Engineering
3EI4-05 Signal & Systems
EC, EI

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. <u>NIL</u>_____   2. <u>NIL</u>_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Define the Continuous and Discrete time signals.

Q.2   Represent the signal x(n) in frequency domain using Fourier series -

      $x(n) = 2 + \cos(2\pi n / 3) + 4 \sin(5\pi n / 3)$

Q.3   Find the Z-transform of $x(n) = a^n u(n)$.

Q.4   What do you mean by periodic and non-periodic signals?

Q.5   Find the Z-transform of the given sequences - {5, 3, –2, 0, 4, –3}

Q.6   Determine the convolution of the given signal -

      X[n] = [1,2,–1,3] and h[n] = [3,–4,2]

Q.7 Elaborate the Dirichlet's condition for the existence of Fourier series.

Q.8 What is aliasing phenomena? How can aliasing phenomena be eliminated?

Q.9 Find e^(−at) is an Energy signal or Power signal.

Q.10 Determine the Discrete Time Fourier Transform of periodic impulse Train.

$$x(n) = \sum_{k=-\infty}^{\infty} \delta(n - kN)$$

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Determine whether or not the following signal is periodic. If it is periodic determine the fundamental period –

$x(t) = \cos t + \sin \sqrt{2}\, t$ $x[n] = e^{\left(\frac{j\pi}{4}\right)n}$

Q.2 Sketch the following signal and check whether it is an energy signal or power signal or neither. $x(t) = e^{-a|t|}$ for $a > 0$

Q.3 Analyze all the Fourier Series Coefficient of $x(t) = \sin\omega t$.

Q.4 Evaluate the periodicity of the following signals -

(a) $x(n) = u(n) + u(-n)$

(b) $x(t) = 2\, e^{\,j(t+\pi/4)}\, u(t)$

Q.5 Determine the Nyquist rate for a continuous time signal.

$x(t) = 8 \cos50\pi t + 10 \sin300\pi t - 10 \cos100\pi t$

Q.6 Describe Zero Order Hold Sampling with reconstruction filter.

Q.7 Consider a discrete-time LTI system with impulse response h[n] given by
h[n] = a^n u[n]
(a)   Is this system causal?
(b)   Is this system BIBO stable?

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   Consider the system $y(t) = x^2(t-t_0)+2$, evaluate if system is -

(i)   Linear   (ii)   Stable

(iii)   Causal   (iv)   Time Invariant

(v)   Deterministic

Q.2   Design and implement an LTI system with impulse response $h(t) = e^{-at} u(t)$ a>0 to the input signal $x(t) = e^{-bt} u(t)$ b>0 . Find the response using convolution property of Continuous Time Fourier Transform for the cases.

(a)   b≠a   (b)   b=a

Q.3   Using the residue method, find the inverse Z-transform of -

$$X(Z) = \frac{1}{(Z-0.25)(Z-0.5)}, \text{ROC: } |Z| > 0.5$$

Q.4   Consider the Periodic square wave, determine the Trigonometric Fourier Series of x(t).

Q.5   Explain Ideal Sampling and Practical sampling in details.

Roll No. _____   Total No. of Pages: 4

3E1224

3E1224

B. Tech. III - Sem. (Main / Back) Exam., February - 2023
Electronic Instrumentation & Control Engineering
3EI4 – 06 Network Theory
EC, EI

Time: 3 Hours   Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   **[10×2=20]**

All questions are compulsory

Q.1 State Kirchhoff's Current law.

Q.2 Draw equivalent circuit for Thevenin's and Norton theorem.

Q.3 State maximum power transfer theorem.

Q.4 Write properties for driving point immittance function.

Q.5 What do you mean by unit step function?

Q.6 State and explain pole zero concept with any example.

Q.7 Write equation for ABCD parameter.

Q.8 Give difference between reciprocity and symmetry for two port network.

Q.9 What do you mean by division rule in circuit?

Q.10 State and explain Kirchhoff's Voltage law.

PART – B

(Analytical/Problem solving questions)   [5×4=20]

Attempt any five questions

Q.1 Find the current in the 2Ω resistance in the circuit shown below using Thevenin's theorem.
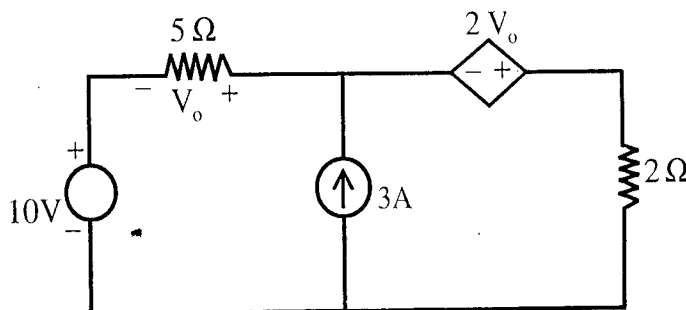
Q.2 Find the current through 3Ω resistor of the circuit given below using Norton's theorem, verify the result using Thevenin's theorem.
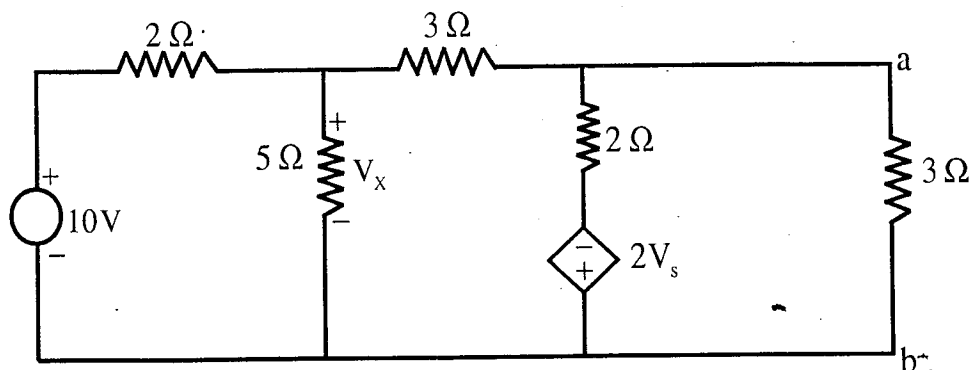
Q.3 What will be $V_0(t)$ if supply is $10e^{-t}U(t)$? Assuming the initial current to be 2A through the Inductor.
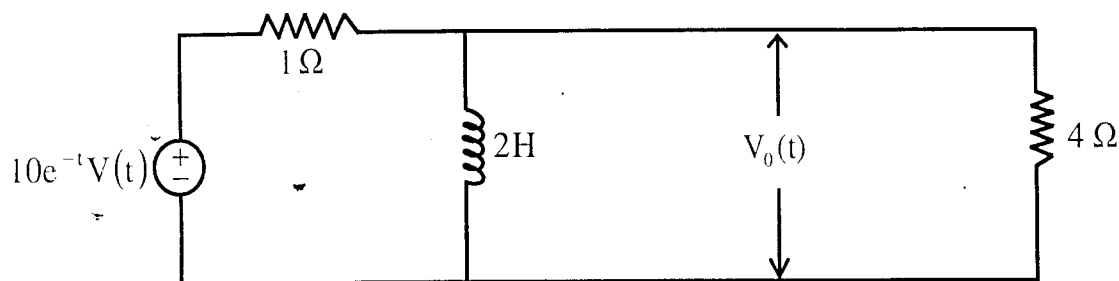
Fig.

Q.4 Test whether the roots of given polynomial lie in right half 's' plane using Routh criterion.

$$P(s) = s^5 + 2s^4 + 2s^3 + 4s^2 + s + 1$$

Q.5 Explain and prove the Superposition Theorem.

Q.6 Determine the transfer function Z_{21} and Y_{12} in the following network.
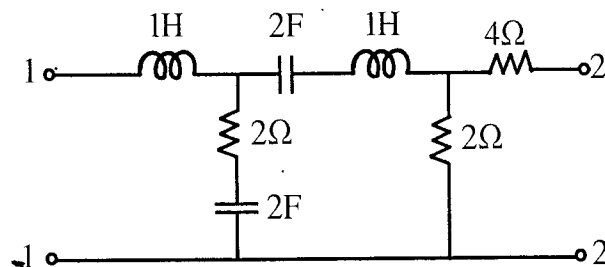
Q.7 Find the Fourier series expansion of the following wave –
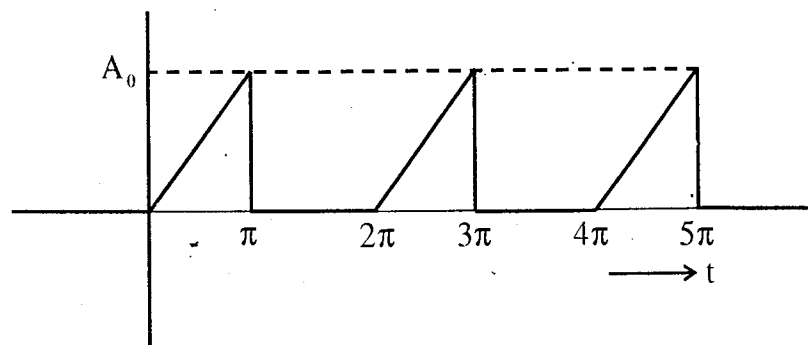
PART – C

Q.1 Find the Y parameters of the network.
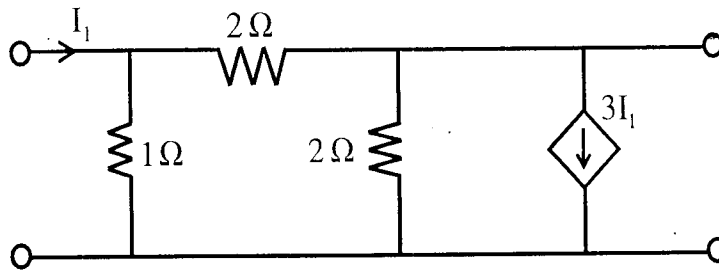
Q.2 Design and explain mesh analysis with any example.

Q.3 Design nodal analysis method for circuit with suitable example.

Q.4 Find the current in the 2Ω resistance in the circuit shown below using Nortons's theorem.
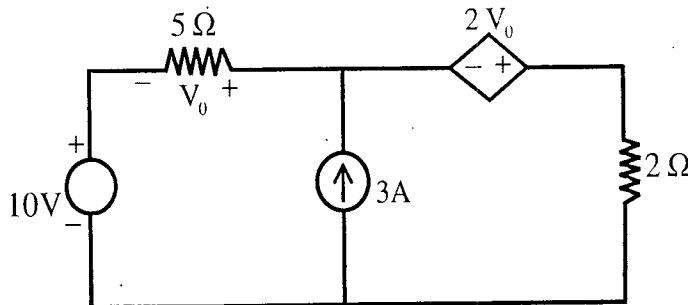
Q.5 An impedance function is given by –

$$Z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+4)}$$

Find the foster first form of the network.

3E1149

3E1149

B. Tech. III - Sem. (Back) Exam., February - 2023
Electronices & Communication Engineering
3EC4-06 Network Theory
EC, EI

Time: 3 Hours **Maximum Marks: 160**
Min. Passing Marks: 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL_____ 2. NIL_____

PART – A [10×3=30]
(Answer should be given up to 25 words only)
All questions are compulsory

Q.1 State the Nortion Theorem.

Q.2 If a load 200 + j50 is connected to a voltage source V = 100 + j50, then find the power delivered to load.

Q.3 If three resistance R_A = 100, R_B = 100, RC = 100 are connected in Delta form, then find R_{AC} in its equivalent Star network.

Q.4 Find the Laplace Transform of 2 u(t) – u(t – T_0).

Q.5 Convert the Thevenin source V = 100–j30, R_{TH} = 100 to its equivalent Nortion source.

Q.6 State two most essential properties of positive real impedance function.

Q.7 Find the Laplace transform of I(t) = 20 t + e^{-5t} Sin 50t.

Q.8 Define the quarter wave symmetry in Fourier series representation.

Q.9   If the cutoff frequency of a low pass filter is 20 KHz and capacitance is 20 microfarad then find the resistance.

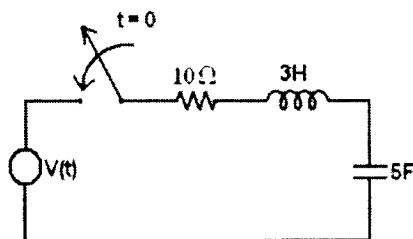Q.10 Find the expression of Z_{11} in terms of Y–parameter.

# PART – B   [5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   What is Compensation Theorem? Explain it with an example.

Q.2   Derive an expression for the response in the system in Figure.2 by time domain and Laplace transform techniques.

Q.3   What is maximum power transfer theorem? Find the power transfer to a load of 120 +j20 from a Norton source
I =100 +j50, R_N = 20 + j 20.

Q.4   Determine the h-parameters after writing the transform network of fig.
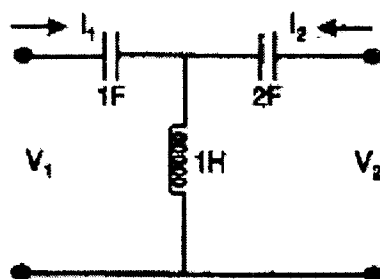
Q.5   Express all h-parameter in terms of Z- parameter. If the Z- parameter are Z_{11} = 10, Z_{12} = 1, Z_{21} = 10, v Z_{22} = 1, then find the corresponding h- parameter.

Q.6   Draw a low pass and high pass filter circuit using RC and RL.

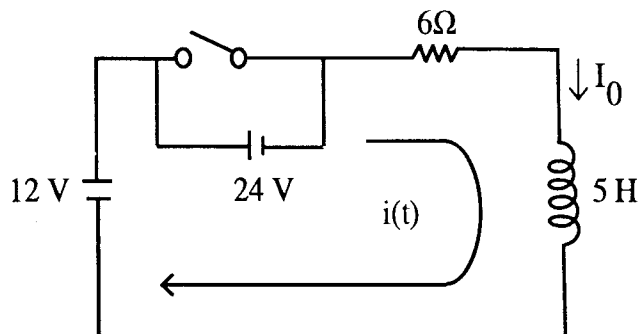Q.7   Obtain the Fourier series expression of the wave form shown in Figure.
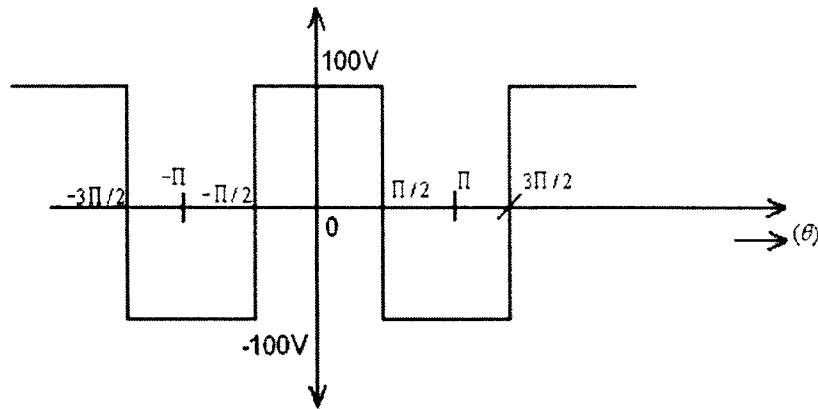
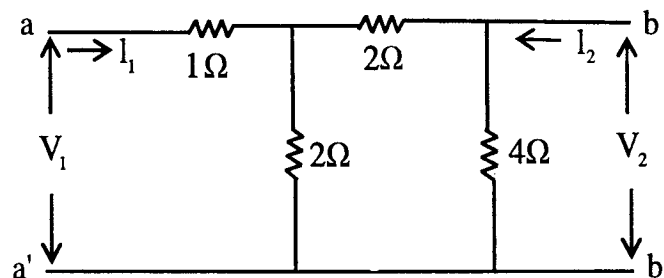
PART – C   [4×20=80]

(Descriptive/Analytical/Problem Solving/Design Questions)
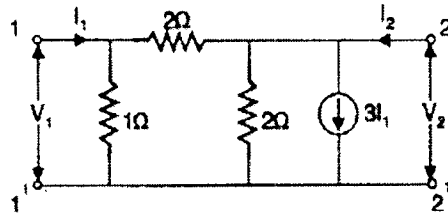
Attempt any four questions

Q.1   Find the current in the circuit shown in Fig. at an instant, after opening the switch if a current of 1A had been passing through the circuit at the instant of opening.

Q.2   Find the Z parameters for the circuit shown in the figure.

Q.3 Find the Transfer impedance Z_{12} and Z_{21} in the following network.

Q.4 What is Superposition Theorem? Does it applicable for nonlinear circuit components? Give two examples of circuit components which are –

(1) bilateral (2) linear (3) nonlinear (4) lumped

Q.5 Determine the current supplied by each battery in the circuit shown in the figure.
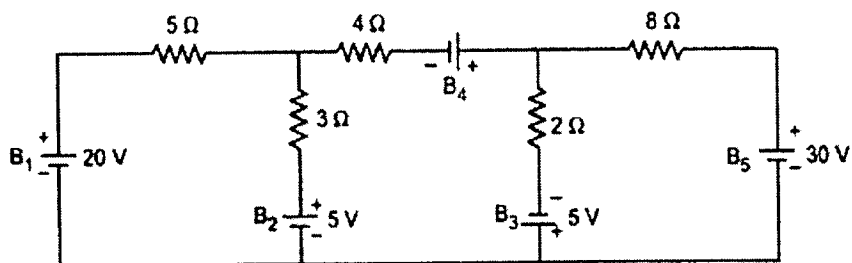
3E1223

3E1223

B. Tech. III - Sem. (Main / Back) February - 2023
Electronic Inst. & Control Engineering
3EI4-07 Electronic Devices
EC, EI

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

    Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

    Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

    Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   [10×2=20]

All questions are compulsory

Q.1   What are degenerate and non-degenerate semiconductors?

Q.2   What is the significance of E-K diagram?

Q.3   Define mobility and conductivity of a semiconductors.

Q.4   Differentiate between Thermistor and Sensitor.

Q.5   What is Poisson equation?

Q.6 Define Diffusion current and Drift current.

Q.7 Out of three configuration of BJT, why common emitter configuration is commonly used?

Q.8 Why the base of a BJT is very thin?

Q.9 What is photolithography in an integrated circuits?

Q.10 What is Avalanche breakdown?

PART – B

(Analytical/Problem solving questions)   [5×4=20]

Attempt any five questions

Q.1 Explain Electronic properties of silicon and germanium.

Q.2 Differentiate between Insulator, Conductors and Metals according to the energy band diagram.

Q.3 Derive an expression for continuity equation.

Q.4. Explain Ebers Moll Model.

Q.5 With a neat sketch, differentiate between Depletion MOSFET and Enhancement MOSFET.

Q.6 How the etching process is carried out in an Integrated Circuits? Explain.

Q.7 Explain Zener breakdown.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)   [3×10=30]

Attempt any three questions

Q.1 Derive an expression for a total current density in a semiconductor.

Q.2 Explain the working of NPN Transistor.

Q.3 With a neat sketch, explain the working of Photodiode and Solar Cell.

Q.4 What is an ion implantation in Integrated Circuits? Explain.

Q.5 With a neat sketch, explain the working of Schottky Diode.

3E1653	

Roll No. _____ Total No. of Pages: 2

3E1653

B. Tech. III - Sem. (Back) Exam., February - 2023
Computer Science & Engineering
3CS3A Digital Electronics
EE, EX, EC, EI, CS, IT, AI

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used/calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT- I

Q.1 Find the 11's complement of following number -   [16]

(a) $(935)_{12}$

(b) $(267)_{12}$

OR

Q.1 Simplify the expression using Boolean Algebra -   [16]

(a) $\overline{\overline{AB} + ABC} + A(B + \overline{AB})$

(b) Find the radix value if -

$(23)_r + (12)_r = (101)_r$

UNIT- II

Q.2 Explain Duality Theorem and De-Morgan's Law with proof. [16]

OR

Q.2 Implement the XOR gate using minimal number of NAND gates. Show that the circuit drawn realizes the XOR gate.

[16]

UNIT- III

Q.3 Compare K-map technique and quine–Mc–Klusky minimization technique. [16]

OR

Q.3 Simplify the following function using tabulation method and verify the result using K-map, $F = \sum(0, 6, 9, 10, 13) + d (1, 3, 8)$

[16]

UNIT- IV

Q.4 Explain the Binary Serial and Parallel Address with proper example. [16]

OR

Q.4 Explain diode switching matrix with proper examples.

[16]

UNIT- V

Q.5 Explain following in details -

    (a)   Flip-flops [16]

    (b)   Counter

OR

Q.5 Explain following in details -

    (a)   Registers [16]

    (b)   Sequential system

3E1641

3E1641

B. Tech. III - Sem. (Back) Exam., February - 2023
Applied Electronics & Instrumentation Engineering
3AI2 Electronic Devices & Circuits
EC, EIC, EE, EX, AI, BM

Time: 3 Hours   Maximum Marks: 80
                                          Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one** question from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT- I

Q.1 (a) What do you mean by Hall Effect? Explain it with suitable diagram. Also derive an expression for Hall Coefficient. [12]

(b) Explain the Mass Action Law. [4]

OR

Q.1 (a) With the help of neat diagram derive expression for continuity equation. [10]

(b) In an N-type semi-conduction, the Fermi level is 0.2eV below the conduction band at the room temperature of 300°k. If the temperature is increased to 350°k, determine the new position of Fermi level? [6]

UNIT- II

Q.2 (a) What do you mean by Voltage Multiplier circuits? With the help of neat diagram explain full wave voltage doubler and voltage tripler. [8]

(b) What do you mean by clamper circuits? With suitable diagram explain the Negative clamper circuit. [8]

OR

Q.2 (a) What do you mean by clipper circuits? With the help of suitable example explain series clipper. [8]

(b) What do you mean by UJT (Unit-Junction Transistor)? With the help of suitable diagram explain working and construction of UJT. [8]

UNIT- III

Q.3 (a) Write short note on Early Effect. [8]

(b) With the help of neat diagram explain the working of BJT (Bipolar Junction Transistor). [8]

OR

Q.3 (a) Explain Ebers Moll Model of transistor. [8]

(b) For the figure shown below find A_i, A_v and R_i? Given $h_{ie} = 1.1k\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 50$ and $h_{oe} = 24\,\mu A/V$. [8]
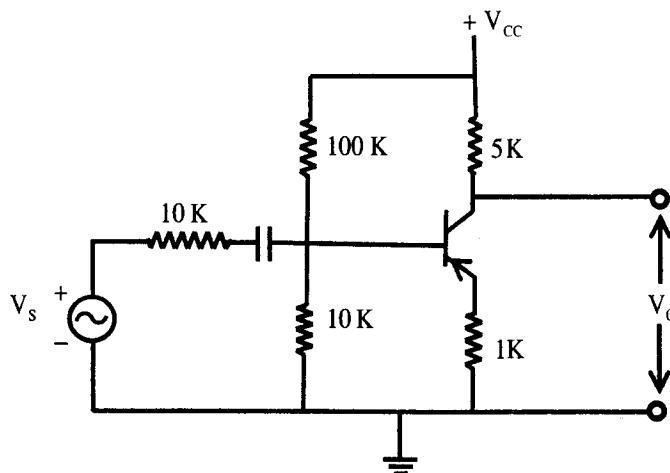
UNIT- IV

Q.4 (a) Explain construction and working of JFET with suitable diagram. Also draw its characteristics and explain it. [8]

(b) Explain the types of MOSFETs and draw symbols for each of them. [4]

(c) Write the differences between BJT and FET. [4]

OR

Q.4 (a) Explain construction and working of n-channel enhancement type MOSFET with suitable diagrams. [8]

(b) Explain FET as a voltage variable resistor. [4]

(c) Write difference between enhancement type MOSFET and depletion type MOSFET. [4]

UNIT- V

Q.5 (a) Write short note on Millar Theorem. [8]

(b) Explain the analysis of mid frequency of RC coupled amplifier. [8]

OR

Q.5 (a) What do you mean by Darlington Emitter Follower? Derive expression for overall current gain for it. [10]

(b) The mid frequency gain of RC coupled amplifier is 100. If lower and upper half power frequencies are 50 Hz and 200 kHz respectively, find out the frequencies at which gain is reduced to 80. [6]