EC-L

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

3E1206

3E1206

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Agriculture Engineering

3AG2-01 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 questions from Part C.

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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   **(10×2=20)**

1. Show $\Delta^3 y_2 = \nabla^3 y_5$.

2. Show that $\Delta^2 e^x = (e-1)^2 e^x$; interval of differencing being unity.

3. Write the formulae of Trapezoidal rule and simpson 1/3 rule.

4. Using Euler method find the value of y(0.025). Given $\frac{dy}{dx} = x + y + xy; y(0) = 1$ and step size $h = 0.025$.

5. Find the inverse Laplace transform of $\frac{1}{s(s^2+1)}$

6. *If $L(F(t)) = f(S)$* then find the Laplace Transform of $F'(t)$.

7. Write the formulae of Fourier sine transform and inverse Fourier sine transform.

3E1206/2024   (1)   [Contd....

8. If $\bar{F}_c[f(x,t)] = \bar{f}(s,t)$ then write $F_c\left[\dfrac{\partial^2 f(x,t)}{\partial x^2}\right]$

9. State convolution theorem for Z - transform.

10. Find $Z(n)$.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. $\hspace{4cm}$ (5×4=20)

1. Show $\Delta\tan^{-1}\left(\dfrac{n-1}{n}\right) = \tan^{-1}\left(\dfrac{1}{2n^2}\right)$, interval of differencing being unity.

2. The distance covered by an athlete for the 50 meter race is given in the following table.

Time (Seconds)	0	1	2	3	4	5	6
Distance (meters)	0	2.5	8.5	15.5	24.5	36.5	50

Determine the speed of the athlete at $t = 5$ sec.

3. Find $L(\sin\sqrt{t})$ and hence obtain $L(\cos\sqrt{t}/\sqrt{t})$.

4. Find $\displaystyle\int_0^\infty \left(\dfrac{e^{-t}-e^{-3t}}{t}\right) dt$

5. Find the Fourier Transform of the following

$$f(x) = \begin{cases} 1-x^2; |x| \le 1 \\ 0 \quad ; |x| > 1 \end{cases}$$

6. Solve the following Integral equation

$$\int_0^\infty f(t)\cos\alpha t\; dt = \begin{cases} 1-\alpha & 0 \le \alpha \le 1 \\ 0 & , \alpha > 1 \end{cases},$$

7. Use convolution theorem to show that $Z^{-1}\left\{\dfrac{z(z+1)}{(z-1)^3}\right\} = n^2$

3E1206 $\hspace{5cm}$ (2)

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. $(3 \times 10 = 30)$

1. From the following table find $f'(6)$

x	0	2	3	4	7	9
f(x)	4	26	58	112	466	922

2. Use Milne's Method to obtain the solution of the equation $\dfrac{dy}{dx} = x - y^2$ at $x = 0.8$ *and at* $x = 1$ given that $y(0) = 0$.

3. Prove $L\left\{\dfrac{\sin^2 t}{t}\right\} = \dfrac{1}{4}\log\left(\dfrac{S^2 + 4}{S^2}\right)$ and hence deduce the integral

   $\displaystyle\int_0^\infty \dfrac{\sin^2 t}{t^2}\,dt$

4. Prove $e^{-x}\cos x = \dfrac{2}{\pi}\displaystyle\int_0^\infty \dfrac{\left(\lambda^2 + 2\right)\cos\lambda x}{\left(\lambda^4 + 4\right)}\,d\lambda$

5. Solve the following difference equation by using Z - transform

   $u_{n+2} - u_{n+1} + u_n = n^2 2^n, \quad u_0 = u_1 = 0$

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3E1250

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Agricultural Engineering

3AG1-02/Technical Communication

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** questions from Part C.*

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**)*

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   (10×2=20)

1. What are various aspects of technical communication?

2. Write two importance of technical communication.

3. Define style in technical communication.

4. What are various steps to read a technical text?

5. List the benefits of note - making.

6. Name different technical texts.

7. Correct the following sentences.

    i)   Both the sister were seen at the party.

    ii)   She is one of the best student in our class.

8. Form two words by using the each prefix - in and - un.

9. Underline and rewrite the noun phrase in the following sentences.

i) The cat with the stripes tried to trip me.

ii) My green gym socks are in the hamper.

10. Write a short note on Linguistic Ability.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   (5×4=20)

1. Explain ERRQ and SQ3R Reading Technique.

2. Reading makes a man complete francis Bacon. How can you develop effective reading skills?

3. What is the process of reading a technical manual?

4. Elaborate various ways to collect information.

5. Enlist various factors which affect designing of a document.

6. What are various types of technical articles? Explain.

7. Enumerate the different characteristics of technical project proposal.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   (3×10=30)

1. Explain various types of note-making.

2. Describe various features of style in technical communication.

3. Assume yourself as the cultural secretary, you are organizing an instrument playing programme in your Institute/College/ University. Draft an e-mail informing all the teachers, students and staff members of your College about the event and invite them to attend the event. Invent the necessary details.

4. Assuming yourself a hostler, write minutes of the meeting, which you have attended with the hostel wardern and chief warden to improve the quality of food served in the hostel mess.

5. Prepare a report on the Campus placement Drive organized in your College on 12th Jan. 2023.

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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 questions from Part C.

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)

PART - A
(Answer should be given up to 25 words only)

All questions are compulsory   (10×2=20)

1. Explain Gross Domestic Product (GDP).

2. Draw circular flow of economic activities

3. Draw graph to show
   a) Perfectly Inelastic Demand
   b) Perfectly elastic demand   (1 + 1=2)

4. What is Giffen Paradox?

5. Give mathematical form of Cobb - Douglas production function.

6. Define Explicit and implicit costs with example.   (1 +1= 2)

7. Draw a chart to show different market structures.

8. List four important features of Monopoly market.   (0.5 × 4 = 2)

9. What is golden rule of accounting for real accounts?   (1 +1 =2)

10. Define payback period.

PART - B
(Analytical/Problems solving questions)

Attempt any Five questions   (5×4=20)

1. Define National Income. Explain steps involved in the estimation of national income by income method.   (1+3=4)

2. Explain economies and diseconomies of scale with examples.   (2+2=4)

3. How will you calculate cash flows from operating activities by direct and indirect method. Explain with example.   (2+2=4)

4. a) Why is the demand curve of a firm under monopolistic competition more elastic than under monopoly? Explain.
   b) Explain 'freedom of entry and exit to firms in industry' feature of monopolistic competition.   (2+2=4)

5. Explain following with help of suitable graph.   (1×4=4)
   a) Zero income elasticity
   b) Negative Income elasticity
   c) Unit incom elasticity
   d) Income elasticity greater than unity

6. Give brief answer of following Questions on Balance Sheet: (1×4=4)
   a) On balance sheet, accruals, notes payable, and account payable are listed under which category?
   b) Inventories, cash and equivalents, and accounts receivables are listed as?
   c) A firm buys products but does not pay to suppliers instantly. This is recorded as?
   d) In a balance sheet, the total of common stock and retained earnings are denoted as?

7. Explain following ratios: (Formula is must)   (2+2=4)
   a) Liquidity Ratio
   b) Solvency Ratio

PART - C

(Descriptive/Analytical/Problems Solving/Design question)

Attempt any Three questions

(3×10=30)

1. a) Complete the following table:

(0.25×30=7.5)

QTY (UNITS)	TFC (Rs.)	TVC (Rs.)	TC (Rs.)	AVC (Rs.)	ATC (Rs.)	MC (Rs.)
0	60		.....	.....	.....	.....
1	.....	30	.....	.....	.....	.....
2	.....	.....	100	.....	.....	.....
3	.....	.....	.....	.....	.....	5
4	.....	.....	.....	.....	28.75	.....
5	.....	.....	15	.....	.....	.....

   b) Draw graph/graphs showing relationship between any five Costs with Quantity (Units).

      You can show them in single graph or in separate five graphs. **(0.5×5=2.5)**

2. Calculate and also comment on degree of elasticity: **(4×2.5=10)**

   a) The price of tea per cup is decreased from Rs. 4 to Rs.3 and the demand of coffee is increased from 2 cups to 4 cups per day. Calculate Cross Elasticity of Demand.

   b) Mr. Gupta's income is raised from Rs. 10,000 to Rs. 15,000 and the demand for good A is raised from 500 to 800 units. Calculate Income Elasticity of Demand.

   c) The demand of commodity X is raised from 200 to 250 units when price decreased from Rs. 8 to Rs. 6. Calculate Price Elasticity of Demand.

   d) If the price rises of good A rises from Rs. 20 to Rs. 30. Its supply increases from 200 to 800 units. Calculate Elasticity of Supply.

3. "Economics is an art." Elaborate this statement by explaining meaning, nature and scope of Economics.

   (2+4+4=10)

4. "A competitive firm is not a price maker, but adjustor." Explain this statement with reference to price determination in long and short term under perfect competition.

   (4+6=10)

   [Contd....

5. From the following balance sheet of Brown and co. Ltd. as on 31st Dec. 2020 and 31stDec.2021:

Liabilities	2020 (Rs.)	2021 (Rs)	Asset	2020 (Rs.)	2021 (Rs.)
Share capital	5,00,000	7,00,000	Land & Building	80,000	1,20,000
Profit & loss a/c	1,00,000	1,60,000	Plant & Machinery	5,00,000	8,00,000
General Reserve	50,000	70,000	Stock	1,00,000	75,000
Sundry creditors	1,53,000	1,90,000	Sundry Debtors	1,50,000	1,60,000
Bills payable	40,000	50,000	Cash at Bank	20,000	20,000
Expenses O/S	7,000	5,000			
TOTAL	**8,50,000**	**11,75,000**	**TOTAL**	**8,50,000**	**11,75,000**

Additional Information:

   a) Rs. 50,000 depreciation has been charged on Plant and Machinery during 2021.

   b) A piece of Machinery was sold for Rs. 8,000 during the year 2021. It had cost Rs. 12,000; depreciation of Rs. 7,000 had been provided on it.

   Prepare a Schedule of changes in Working Capital and a Statement showing the Sources and Application of Funds for 2021. **(3+3+2+2=10)**

   (Show Adjusted Profit & Loss Account and Plant & Machinery Account in working notes.)
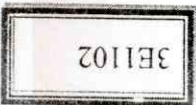
Total No. of Questions: Total No.of Pages:

Roll No. _____

B.Tech. III-Sem (Back) Exam 2024
HSMCAeronautical Engineering
3AN1-02Technical Communication
3E1102

All branches

Time: 2 Hours   **Maximum Marks: 80**
                          Min. Passing Marks: 28

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 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 _____   2. _____

Part A(Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 what is the meaning of Technical communication?

Q.2Write Down the Various Communication Skills?

Q.3What is the importance of Conference?

Q.4why do we take notes from a long passage? What is its utility?

Q.5Rewrite the name of the following book as you would put it in a bibliographical reference: 1979. 3rd edition. Macmillian. The Elements of Style written by W. Strunk and E. B. White.
                                                                    5 x 2 = 10

Part BAnalytical/Problem solving questions
Attempt any four questions

Q.1Write an oral presentation for a debate on "Modern Technology is doing more harm than good to man". You are to speak for one minute in favour of the topic.

Q.2How is technical paper written?

Q.3What do you understand by the term technical communication? How is it different from general purpose communication?

Q.4.What is group discussion? Discuss the importance of group discussion and how it is helpful in interviews?

Q.5should email replace the communication forms such as memos and letters? Explain your answer?

Q.6What is Report? Discuss various sections of a formal report in detail.
                                                                    4 x 10 =40

Part C(Descriptive/Analytical/Problem Solving/Design Question)
Attempt any two questions

Q. 1As the purchase officer of a company, write a complaint letter to comfort Home Appliances, New Delhi, pointing out the damage which was discovered after checking the consignment containing Refrigerators sent to you by supplier

Q.2Write the difference between the following terms with suitable examples:-
      (a) Memos and reports.
      (b) Press release and newsletters
      (c) Dissertation and thesis
      (d) References and bibliography

Q.3Write an essay on one of the following:-
a) India in 20-20
b) Role of youth society.

                    2 x 15 =30

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Total No. of Questions:　　　　　　　Total No.of Pages:

Roll No.

B.Tech.III Sem (Back) Exam 2024
HSMCAeronautical Engineering
3AN1-03Managerial Economics & Financial Accounting
3E1103
All branches

Time: 2 Hours　　　　　　Maximum Marks: 80
　　　　　　　　　　　　Min. Passing Marks: 28

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 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. _____　　2. _____

Part A(Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Define Managerial Economics?

Q.2 What is Normative Theory of Economics?

Q.3What are the features of Oligopoly?

Q.4 Define Time Value of Money?

Q.5 Mention the concept of Demand?
　　5 x 2 = 10

Part BAnalytical/Problem solving questions
Attempt any four questions

Q.1Describe fully the concept of price elasticity of demand?

Q.2State the relationship of managerial economics with Other Subjects?

Q.3 What is Perfect Competition State its features?

Q.4.Explain the Different Features of Business Cycle?

Q.5 Explain Capital Budgeting?

Q.6Calculate the BEP in units and rupees using the following details: • Selling price per unit Rs. 100 • Variable costperunitRs.60•FixedcostsRs.20,000•ActualsalesRs.2,00,000　　4 x 10 =40

Part C(Descriptive/Analytical/Problem Solving/Design Question)
Attempt any two questions

Q. 1 Explain the concept of Managerial Economics? List out the applications and importance of Managerial Economics?

Q.2How is price and output determination under monopoly different from that under perfect competition?

Q.3. A Company prepares a budget to produce 3, 00,000 Units, with fixed costs as Rs. 15, 00,000 and average variable cost of Rs.10 per unit. The selling price is to Yield 20%profit on Cost. You are required to calculate
(a) BEP in Rupees
(b) P/V Ratio
(c) Margin of Safety
　　　　　　　　　　2 x 15 =30

3E1222

3E1222

B.Tech. III Sem. (Main & Back) Examination, January/February - 2024
Electronics and Comm. Engg.
3EC4-04 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 questions from Part C.

Schematic diagrams must be assumed 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)

PART - A

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

ALL questions are compulsory.

1. In a number system of base R, A and B are the successive digits such that $(AB)_R = (28)_{10}$ and $(BA)_R = (35)_{10}$.
Determine the base R of the number system and the values of A and B.

2. Convert (1101) Gray code into its equivalent BCD number.

3. Given the Two binary numbers X=1010100 and Y=1000011, Perform the following Subtraction X - Y using 2's complements method.

4. Define Noise margin for a logic family.

5. What is the difference between latch and flip-flop?

6. Draw the excitation table of J/K Flip-flop.

7. Draw the logic diagram of Full-adder using half-adder.

8. Write the VHDL code of D flip-flop.

9. Simplify the following expression: $Z = \overline{(AB)}.\overline{(AC)}.\overline{ABC}$

10. If the present output of a twisted ring counter is "0111", then what what will be its output after 4- clock pulses?

PART - B

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

Attempt any FIVE questions.

1. What is the race around condition in flip-flops? Explain the master slave flip flop method to resolve this.   (2+2=4)

2. Design a Logic circuit that has a 3-bit binary input (PQR) and a single output(Y) specified as follows: (4)

   Y = 0, when the input is less than 5_{10}

   Y = 1, otherwise

   Consider P as most significant bit.

3. i) Differentiate between Mealy and Moore state machine.   (2+2+=4)

   ii) Explain the procedure for conversion of JK Flip Flop to SR Flip Flop.

4. i) Implement the following function using 8x1 mux. Take B, C, D as selection lines. F (A,B,C,D) = Σm (0,3,4,7,8,9,13,14).   (2+2=4)

   ii) Find the Boolean function implemented by 4x1 mux shown in below figure:
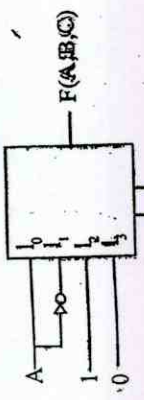
5. Draw and Explain 2 input ECL NOR/OR gate circuit.   (4)

6. Write down the VHDL code (using behavioural modelling) of D&T - flip flop.   (2+2=4)

7. Minimize the following Expression using k-map technique: (2+2=4)

   i) Z (A,B,C) = Σm (1,3,6,7)

   ii) F (P,Q,R,S) = Σm (0,2,5,7,8,10,13,15)
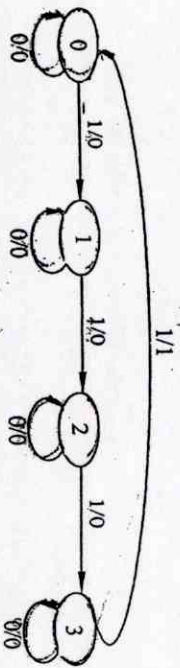
3E1222   (2)   [Contd....

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions. (3× 10 = 30)

1. Construct the Mealy FSM (using J/K flip-flop) circuit to represent the state diagram given below: (5+5=10)

Show its state table, state assignment table and final implemented logic.

2. Design a Synchronous counter using Toggle(T) Flip-flop, that has the following sequence: 000, 010, 101, 110, 111 and repeat. The undesired states 001, 011 and 100 must always go to 000 on the next clock pulses. (Counter with skipping states). (10)

3. Classify the different types of architecture modelling styles in VHDL? Explain any two Modelling styles with the help of example. (2+4+4=10)

4. i) Minimize the following expression using k -map :

   $F(A,B,C,D) = \Sigma \ m(1,2,3,4,7,11,13)+d \ (9,15)$

   Also implement the minimized function using NAND Gates only. (5+5=10)

   ii) Minimize the following Logic function using K-map and then realize the minimized logic function using NOR gates only:

   $F(A,B,C,D) = \pi \ M(4,5,6,7,8,12)+d \ (1,2,3)$

5. Write short note on following (any two): (5+5=10)

   i) FPGA

   ii) Tristate TTL logic family

   iii) Barrel shifter

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3E1147

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3E1147

B.Tech. III - Sem. (Back) Examination, January/February - 2024
Electronics & Communication Engineering
3EC4-04 Digital System Design
(EC, EI)

Time : 3 Hours

Maximum Marks : 120
Min. Passing Marks: 42

Instructions to Candidates:

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

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)

PART - A

(Answer should be given up to 25 words only)

ALL questions are Compulsory.

(10×2=20)

1. Implement OR Gate using NAND Gate only?

2. Design one-bit Magnitude Comparator?

3. Write the VHDL code for XOR Gate using Dataflow modelling?

4. Determine the Radix value of $(11)_R+(25)_R=(102)_R$.

5. Draw the logic circuit of 4:1 Multiplexer?

6. State the advantage of Finite state Machine?

7. Give the comparision between PAL (Programmable array logic) and PAL (Programmable logic Array)?

8. Explain various types of Delay in VHDL?

9. Distinguish between combinational and sequential circuits?

10. Define : i) Fan - in ii) Propagation Delay? wrt. logic families?

PART - B

(Analytical/Problem solving questions)

Attempt any FIVE questions.   (5×8=40)

1. Design a 3 - bit synchronous counter using T-Flip-Flop?

2. Write the VHDL code for 4-bit ripple carry adder using structural modelling?

3. Draw and explain CMOS NAND and NOR gates?

4. Obtain the minimal SOP expression using karnaugh map technique? Also implement It using Basic Gates?

    $$F(w,x,y,z) = \Sigma m(0,7,8,9,10,12) + \Sigma d(2,5,13)$$

5. Explain Full adder and Implement a Full Adder circuit using 3×8 Decoder?

6. Find the boolean function(x) Implemented by :
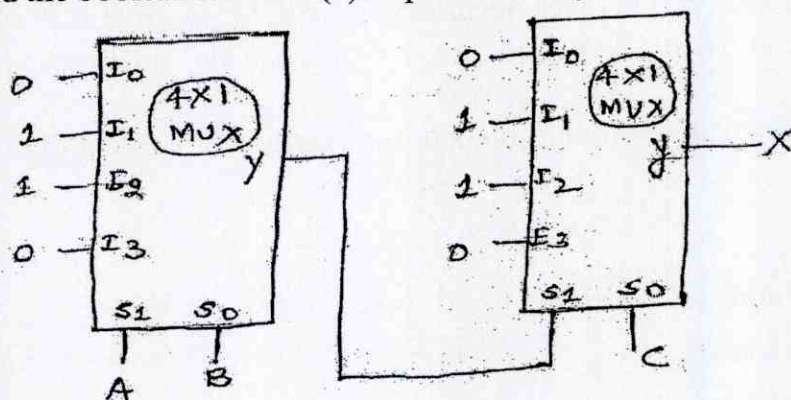
7. What are the counting states (Q_1, Q_0) for the circuit using D-Flip-Flop as shown in figure?
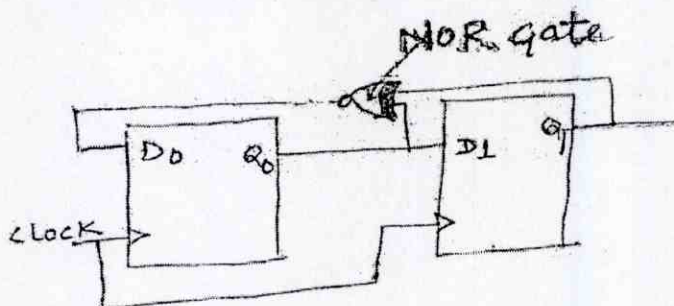
PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any FOUR questions.   (4×15=60)

1. a) Draw the circuit diagram and explain the operation of 2 F/p TTL NAND gate with Totem - pole output?   (10)

    b) A certain gate draws 1.8mA when it output is High and 3.2mA when its output is low. What is its average power dissipation if Vcc is 5V and it is operated on a 50% duty cycle?   (5)

3E1147   (2)

2. a) What is Race-around condition? How it can be avoided?   **(15)**

    b) Design a Binary counter with following Binary sequence using JK FF : 7, 3, 1, 2, 5, 4, 6, 7, 3, 1, 2, 5, 4, 6, ...   **(10)**

3. a) Implement 16×1 multiplexer using 4×1 multiplexer?   **(7)**

    b) For the circuit shown in the following figure. I_0-I_3 are inputs to the 4 : 1 multiplexer, R(MSB) and S are control inputs. The output 'z' can be represented/given by   **(8)**
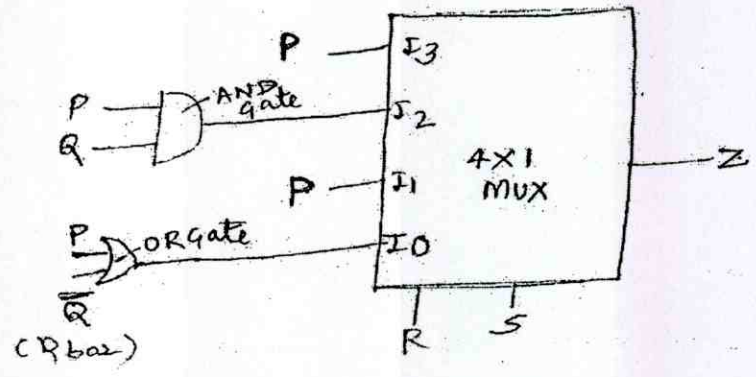
4. a) What do you mean by Encoder? Write a short note on 4:2 priority Encoder?**(5)**

    b) Design a combinational circuit which generate output '1' if 4-bit input contains even number of one's and outputs zero otherwise?   **(10)**

5. Explain different modelling styles in VHDL Language? Also, write VHDL code of "SRFF" using Behavioural modelling (Case statement)?   **(15)**

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3E1225

B.Tech. III-Sem. (Main and Back) Examination, January/February - 2024

Electronics and Comm. Engg.

3EC4-05 Signal and 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 questions from Part C.

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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   (10×2=20)

1. Find whether the signal is energy signal or power signal $x(n) = (0.5)^n u(n)$

2. What are causal system ? Why are non-causal unrealizable?

3. Find the leplace transformation of $x(t) = te^{-2t} u(t)$

4. State and prove convolution theorem in relation to Fourier transform.

5. Find z - transform for $x(n) = 2^n u(n)$

6. Evaluate $\int_{-\infty}^{\infty} e^{-2t} \delta(2t-2)\, dt$

7. Find the nyquist rate of given signal , if nyquist rate of $x(t)$ is ω_s, $y(t) = x(t) \cos \omega_o t$

8. Compute exponential fourier series coefficient of $x(n) = 3 + \sin\left(\frac{2\pi}{5}\right)n + \cos\left(\frac{2\pi n}{5} + \frac{\pi}{3}\right)$

9. Define Duality property with respect to fourier transformation.

10. Define Region of convergence (ROC).

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   (5× 4 = 20)

1. Check for causality, stability and memory less property for following signals.

   a) $h(t) = e^{-at} u(t+3)$

   b) $h(n) = u(n+1) - u(n-1)$

2. Determine fourier series coefficient of $x(t)$ given as
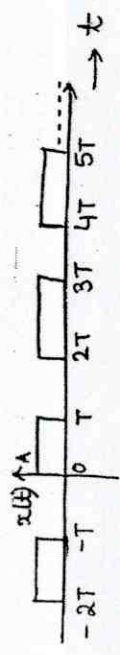
3. Find the inverse replace transform of $X(S) = \dfrac{2S+4}{S^2+4S+3}$ for non causal and unstable system.

4. Prove the following properties with respect to fourier transform

   a) Convolution in time domain

   b) Time differentiation Property.

5. Define Aliasing? What is the reason of Aliasing? Explain mathematically.

6. Determine z-transform of sequence $g(n) = (n+1)\, u(n)$

7. Define sampling theorem Differentiate between natural and flat - top sampling.

3E1225   (2)

3E1225/2024   (1)   [Contd....

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.   (3× 10 = 30)

1. Find the inverse Z transform (Using long division).

$$X(z) = \frac{1+z^{-1}}{1-\frac{1}{3}z^{-1}}$$

When   a)   ROC : $|z| > \frac{1}{3}$

       b)   ROC: $|z| < \frac{1}{3}$; using power series expansion.

2. State space representation of continuous time system is defined using matrix.

$$A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \quad C = \begin{bmatrix} 1 & 3 \end{bmatrix} \quad D = [3]$$

Determine transfor function of continuous time signal.

3. Find the convolution of $x(n)$ if $x(t) = (0.4)^n u(n)$ and $h(n) = (0.8)^n u(n)$

4. Find singnal $x(t)$ if $x(t)$ = real and periodic with period = T; Fourier Series coefficient (X_n), $X_n = 0$ for n = 0, $|n| > 2$; and X_1 = real and positive number;

$$x(t) = -x(t-3);$$

$$\frac{1}{6}\int |x(t)|^2 \, dt = \frac{1}{2}$$

5. Find the inverse laplace transform of $X(s) = \frac{-5s-7}{(S+1)(S-1)(S+2)}$ if ROC is

   a) R (s) > 1
   b) R (s) < -2
   c) -1 < R (s) < 1
   d) -2 < R (s) < -1

_____

Total No. of Questions: _____

Total No. of Pages:

Roll No. _____

B.Tech.III Sem (Back) Exam 2024
Electronics & Communication Engineering
3EC4-05 Signal & Systems
3E1148
EC,EI

Time: 3 Hours

Maximum Marks: 120
Min. Passing Marks: 42

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

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. _NA_   2. _____ NA _____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

10 x 2 = 20

Q.1   Find the Z-transform of $X(n)=a^n u(n)$.
Q.2   What are causal system? Why are non-causal system unrealizable?
Q.3   State and prove convolution theorem in relation to Fourier Transform.
Q.4   Describe the continuous and discrete time signal.
Q.5   What is Aliasing? Discuss any two corrective measures to combat of Aliasing.
Q.6   Find Laplace Transform of $f(t) = t^3 + 3t^2 - 6t + 4$
Q.7   Find $e^{(-at)}$ is sin energy signal or power signal
Q.8   If Fourier transform of $x(t)$ is $X(\omega)$. What will be the Fourier transform of $x(at)$? (a>0).
Q.9   Distinguish the stable and unstable system.
Q.10   Write properties of Laplace transform.

Part B (Analytical/Problem solving questions)
Attempt any Five questions

5 x 8 = 40

Q.1   Find inverse Z-Transform of $X(z) = e^{1/z}$ with ROC of all z - plane except $|z|=0$.
Q.2   Explain properties of ROC of Z-transform.
Q.3   Find the Nyquist rate of the following signal.
(a) $\text{sinc}^2(50t)$
(b) $\sin (50\pi t) + \cos (100\pi t)$
Q.4   Check for the causality and stability property for the following signals.
(a) $h(t) = e^{-at} u(t)$
(b) $h(n) = u(n) - u(n-2)$
Q.5   Determine the Fourier Transform of
        $x(n) = \sin (\omega_0 n) U(n)$
Q.6   Define different properties of system with suitable examples.
Q.7   Differentiate the real and flat top sampling.

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

4 x 15 = 60

Q.1   Explain the properties of continuous time Fourier Transform.
Q.2   (a) Find the Fourier transform of the signal $x(t) = e^{-at} \cos\omega_0 t.u(t)$.
         (b) Find the Fourier transform of the unit step function.
         $$x(t) = \begin{cases} 1, & t \geq 0 \\ 0, & t < 0 \end{cases}$$
Q.3   The response $y(t) = 2 \, e^{-3t} \, u(t)$ if input $x(t) = u(t)$ to a continuous time LTI system.
         (a) Find impulse response of system
         (b) Find output y(t) if input is changed to $x(t) = e^{-t} u(t)$
Q.4   State and prove various properties of Z- transform.
Q.5   State the sampling theorem for low pass signals. Prove that there is a loss of information due to aliasing or under sampling.

Roll No. _____ [Total No. of Pages : 4

3E1224

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Electronics and Comm. Engg,

3EC4-06 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 questions from Part C.

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)

PART - A

(Answer should be given up to 25 words only)

ALL questions are Compulsory.   (10×2=20)

1. State KVL and KCL.

2. Determine i_x and v_x in the circuit of Fig. 1.
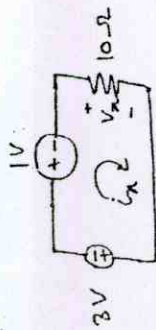
Figure-1

3. Write the statement of Norton's Theorem.

4. What are the limitations of reciprocity theorem.

5. Sketch the function described:

a) $v = 0$, $-2 < t < 0$ and $v = 5$, $0 < t < 2$.

(1)

6. Define power factor.

7. State the initial and final value theorem.

8. Compute the quality factor of an RLC series circuit, with $R = 2\Omega$, $L=50$ mH and $C = 1$ μF.

9. Explain significance of pole and zero of a network function.

10. Define Driving point function.

PART - B

(Analytical/Problem solving questions)

Attempt any FIVE questions.   (5×4=20)

1. Determine the voltage v_x in the circuit of Figure 2, and the power supplied by the 1. A source.

Figure-2

2. Obtain values of all three mesh currents as labeled in figure 3.

Figure-3

3. Find i using super position theorem of figure 4.

Figure-4

4. Find current through R_L in figure 5 using thevenin's theorem.
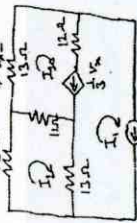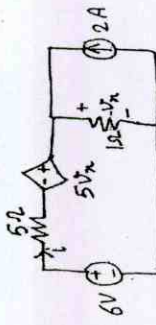
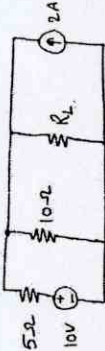Figure-5

(2)

3E1224   [Contd....

107
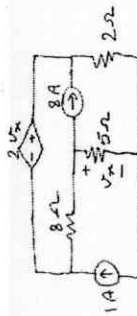
5. Find the Fourier series of the function shown in figure 6. and is represented by

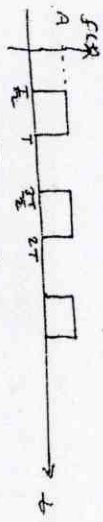$$f(t) = \begin{cases} 0 & 0 < t < T/2 \\ A & T/2 < t < T \end{cases}$$

Figure 6.

6. For the circuit shown in figure 7, obtain the current through the capacitor. (c) at t = 0+ following switching at t=0. Assume the capacitor to be initially discharged.
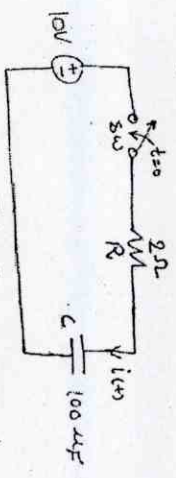
Figure-7

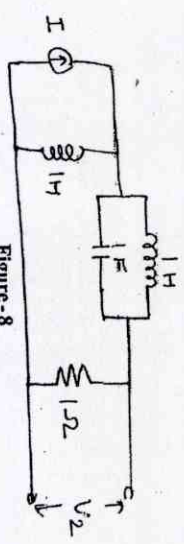**7.** Obtain the transfer impedance (z_{12}) for the circuit shown in figure. 8.

Figure-8

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

(3×10=30)

Attempt any THREE questions.

1. Two networks have been shown in figure 9 obtain the transmission parameters and Z - Parameters of the resulting circuit when both the circuit are in cascade.

Figure - 9

3E1224

(3)
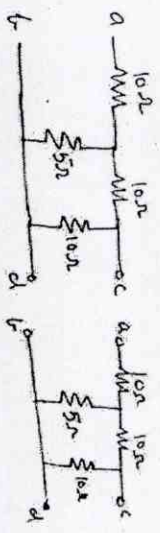
[Contd...

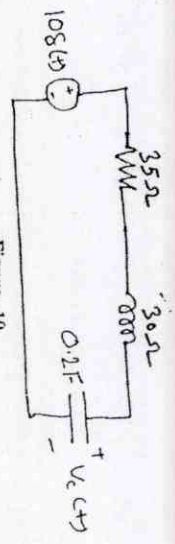**2.** Find $V_c(t)$ for the circuit shown in Figure 10. (I(0) =0) using Fourier transform.

Figure - 10

3. In figure 11, the switch is closed at position 1 at t=0. At t = 0.5 m sec. the switch is moved to position 2. Find the expression for the current in both the conditions and sketch the transient.

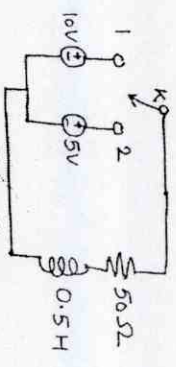Figure - 11

4. Find the impulse response of the voltage across the capacitor in the network in figure 12. Also determine response $V_c(t)$ for step input using Laplace transform.
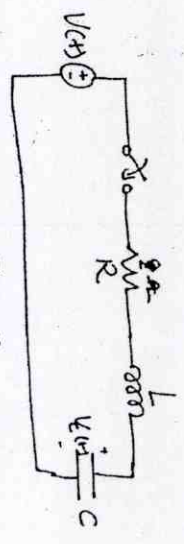
Figure - 12

5. Write the statement of Tellegen's theorem. Explain and prove the Tellegen's theorem using suitable example and give the steps for solution of a network using Tellegen's theorem.

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3E1224

(4)

B.Tech. III-Semester (Back) Exam. 2024
PCC Electronics & Communication Engineering
3EC4-06 Network Theory
3E1149
EC,EI

Time: 3 Hours   **Maximum Marks: 160**

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

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

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 What do you mean by a linear bilateral network?

Q.2   Explain the source-transformation technique.

Q.3   Describe the term 'Time constant' of a circuit, in general.

Q.4   Define complex frequency and its representation.

Q.5   State the superposition theorem.

Q.6   Why do you short circuit the voltage source and open the current source when you find Thevenin's voltage of a network?

Q.7   What is the reciprocity theorem?

Q.8   What are the classifications of filter?

Q.9   Define the power factor.

Q.10 Define mesh analysis of a circuit.

$$10 \times 3 = 30$$

Part B(Analytical/Problem solving questions)
Attempt any Five questions

Q.1 Derive the expression for star-connected resistances in terms of delta-connected resistances.

Q.2 Calculate the current in the 4 ohm resistor of Fig. below using the superposition theorem.
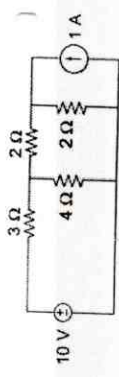
Q.3 State and prove Tallegen's theorem. Show with an example how theorem can be usefully employed in circuit analysis.

Q.4. Find the Fourier series for the waveform shown below-
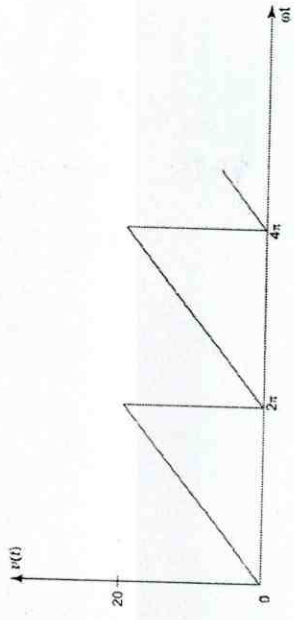
Q.5   Explain the principle of duality. Write a graphical procedure to draw a dual network.

Q.6   Draw the m-derived figh-pass filter. Plot attenuation phase shift, and characteristic impedance vs frequency for m-derived filter.

Q.7   State and explain the initial and final-value theorems and also define maximum power - theorem.

$$5 \times 10 = 50$$

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any four questions

Q.1   Find the Laplace transforms of the following functions.
(a) $t^3 + at^2 + bt + 3$
(b) $\sin^2 5t$
(c) e^{5t+6}
(d) $\cosh^2 3t$

Q.2   Obtain Thevenin's equivalent circuit. Hence, find the current flowing through the 10 ohm
load in below circuit.
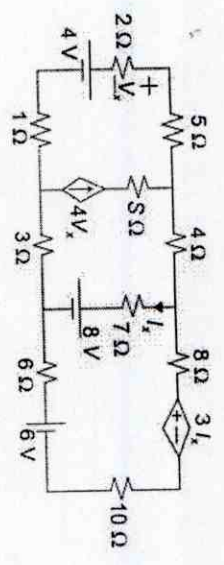
Q.3   Derive the transient response of a series R-L-C circuit with dc input. Sketch the variation
of current and of the voltage across the inductor.

Q.4   Design a low-pass filter T-sections and π – sections having a cut-off frequency of 2 kHz
to operate with a terminated load resistance of 500 V.

Q.5   Use nodal analysis to find V_2 in the circuit shown below.
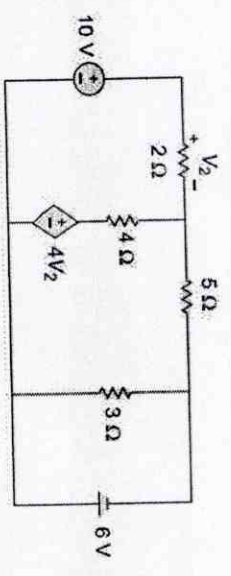
4 x 20 = 80

3E1223

B.Tech. III Sem. (Main&Back) Examination, January/February - 2024

Electronic and Comm. Engineering

3EC4-07 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 questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used 1 Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1.   Explain Drift velocity and Drift current?

2.   What is a MOSFET? How is it different from a JFET?

3.   What is meant by Thermal Stabilization?

4.   What is P-N Junction?

5.   Explain Energy bond diagram?

6.   What is semi conductor?

7.   What is meant by Photo Lithography?

8.   What is Transition time?

9.   What are the advantages of using a FET instead of a BJT?

10. What do you mean by Mobility and Resistivity?

PART - B

(Analytical/Problem solving questions)

Attempt any FIVE questions.   (5× 4 = 20)

1.   Write the short note on Twin - tub fabrication Process.

2.   Derive relation for P-N Junction's Poisson equation.

3.   Explain the process P-type and N-type semi conductor formation with doping.

4.   Write the short note on LED and Photo diode.

5.   Explain the working of NPN transistor with characteristics.

6.   Differentiate between Degenerate and Non degenerate semi conductors.

7.   Give the brief classification of conductor, semi-conductor and Insulator on the basis of energy band diagram?

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

**Attempt any THREE questions.**   (3× 10 = 30)

1   Differentiate between direct and Indirect band gap in context of E-R diagram.

2.   Explain process of fabrication of CMOS in detail with neat and clean sketch for each step.

3.   Design I-V characteristics for Schottry diode and give application of Zener diode.

4.   Which configuration of transistor is used generally and why? Also explain working of transistor as a switch.

5.   A sample of Si at a given temperature "T" in intrinsic condition has a resistivity of $25×10^4 \ \Omega$ – cm. The sample is now doped to the extent of $4×10^{10}$ donor atoms 1cm^3 and 10^{10} acceptor atoms/ cm^3. Find the total conduction current density if an electric field of 4v/cm is applied across the sample.

     Given that μ_n = 1250 cm^2/V-s
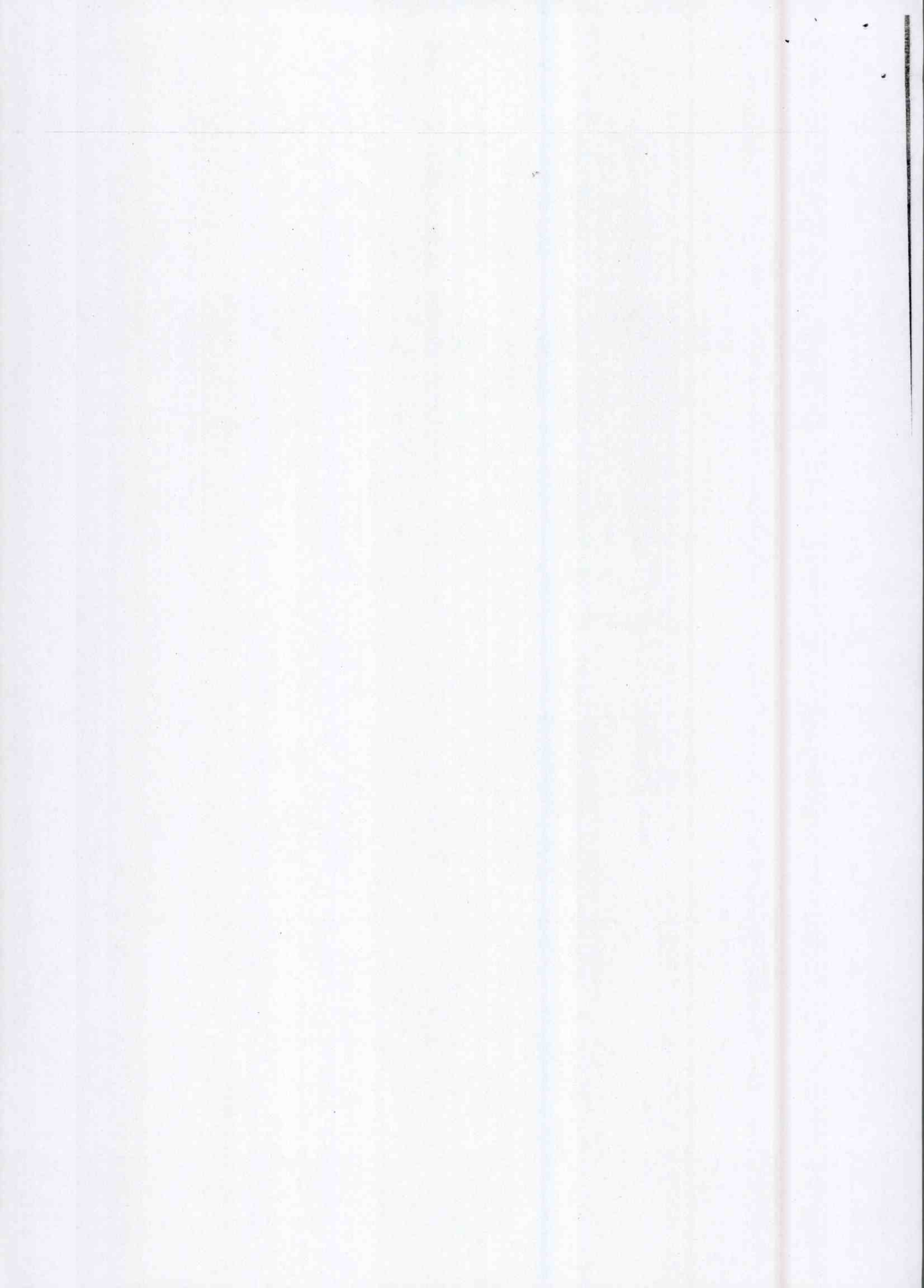
                          μ_p = 475 cm^2/V-s

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Total No. of Questions: Total No. of Pages:

Roll No. _____

B.Tech. III-Semester (Back) Exam. 2024
PCC Electronics & Communication Engineering
3EC4-07 Electronics Devices
3E1150
EC,EI

Time: 3 Hours   **Maximum Marks: 160**

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

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. __NA__   2. _____NA_____

Part A (Answer should be given up to 25 words only)
All questions are compulsory   **(10 x 3 = 30)**

Q.1 Write one difference between Degenerate and non-Degenerate semiconductors.
Q.2 Define intrinsic and extrinsic semiconductor with examples.
Q.3 Define drift and diffusion current with equation of net hole current.
Q.4 Out of three configurations of BJT, why common emitter configuration is commonly used.
Q.5 Why the base of BJT is very thin?
Q.6 What is avalanche breakdown?
Q.7 Write one difference between LED and LASER diode.
Q.8 Define sheet resistance and its unit.
Q.9 Define stability factor of transistor.
Q.10 Define etching process in integrated circuit fabrication.

Part B(Analytical/Problem solving questions)
Attempt any Five questions   **(5 x 10 =50)**

Q.1 Draw input and output characteristics of common base (CB) configuration and show all h parameters on it.
Q.2 Explain Ebers Moll Model in detail.
Q.3 Write short note on
   (a) Light Emitting Diode
   (b) Photo Diode
   (c) P-V Plate
Q.4. (a) Explain band gap theory in semiconductors.
   (b) Derive the relation for continuity equation in P-N Junction diode.

Q.5 How Zener diode is used for voltage regulation. Design such regulator in which input voltage vary in (10-12) volt and across load we need constant voltage 6V, even the load changed between 10- 12kΩ
Q.6 Draw MOSFET VI characteristics at different gate-source voltage (V_{GS}) and show the atomic and saturation region on it.
Q.7 Define following processes
   (a) Sputtering
   (b) Chemical Vapor Deposition

Part C
(Descriptive/Analytical/Problem Solving/Design question)
Attempt any four questions   **(4 x 20 = 80)**

Q.1 Explain the working of NPN transistor.
Q.2 (a) Derive relation for P-N junction's Poisson equation.
   (b) Design I-V characteristics for Schottky diode and give applications of Zener diode.
Q.3 Explain process of Diffusion and Ion Implantation in Integrated circuit fabrication.
Q.4 Write short note on
   (a) Direct bandgap materials
   (b) Thermistors and sensitors
Q.5 (a) Explain the process of fabrication of CMOS in detail with neat and clean sketch diagram for each step.
   (b) Design CMOS circuit for NAND gate.

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