SASTRA DEEMED UNIVERSITY

(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

May 2025

Course Code: **CSE322**

Course: **COMPUTER NETWORKING PRINCIPLES & COMPONENTS**

QP No. **:U037-6** Duration: **3** hours

Max. Marks**:100**

PART - A

Answer any FOUR questions **4 x 20 = 80 Marks**

1. a) A multiplexer combines four 100-kbps channels using a time slot of 2 bits. (4)
   i) What is the frame rate?
   ii) What is the frame duration?
   iii) What is the bit rate?
   iv) What is the bit duration?
   b) Compare and contrast Synchronous, Asynchronous, and Isochronous data transmission methods. (6)
   c) Discuss in detail the responsibilities of each layer in ISO-OSI model with a neat diagram. (10)

2. a) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. What is the actual bit string transmitted? Suppose the third bit from the left is inverted during transmission. How will the receiver detect this error? (6)
   b) In GB-3, if every 4th packet that is being transmitted is lost and if we have to send 10 packets then how many total transmissions are required? (4)
   c) Describe the CSMA/CA algorithm with step-by-step working. (10)

3. a) Consider a network where a circuit-switched connection is established between two users. The link has a data rate of 1 Gbps and each circuit-switched connection requires a fixed bandwidth of 50 Mbps. (4)
   i) How many simultaneous connections can be supported on this link?
   ii) If each connection lasts 5 minutes, how many users can be served in 1 hour assuming 100% utilization?

   b) Consider an instance of TCP's AIMD algorithm where the window size at the start of the slow start phase is 4 MSS and the threshold at the start of first transmission is 32 MSS. Assume that time out occurs during the 6th transmission and starts with 1 MSS. Find the congestion window size at the end of 9th transmission. (6)

   c) In an IP packet, the value of HLEN is 6_{16} and the value of the total length field is 0038_{16}. How many bytes of data are being carried by this packet? (4)

   d) Explain DORA Process in DHCP with a neat client-server scenario. (6)

4. a) Discuss in detail the iterative and recursive query of DNS naming resolution with a neat diagram for each. (10)

   b) Write short notes on the following. (10)
   i) IMAP
   ii) POP3
   iii) HTTP Request Methods.

5. a) In a CSMA/CD network running at 1 Gbps over 2 km cable with no repeaters, the signal speed in the cable is 400000 km/sec. What is the minimum frame size? (6)

   b) There are 5 stations in a slotted LAN. Each station attempts to transmit with a probability P=0.2 in each time slot. What is the probability that ONLY one station transmits in a given time slot? (4)

   c) Compare and contrast IPv4 with IPv6. (6)

   d) An IP packet of size 1600 bytes passes through network segment before it reaches its destination. The header size of this packet is 30 bytes. The maximum size of an IP packet in intermediate

network (MTU) is 1400 bytes. How the IP packet would be fragmented in a router. Find all the information for each fragment. (4)

6. a) Write short notes on the following. (10)
   i) ARP
   ii) RARP
   iii) BOOTP.

   b) A 10 MB file needs to be sent over a packet-switched network. The network link has a transmission rate of 10 Mbps, and the packet size is 1 KB. The propagation delay is 10 ms, and each packet has a processing delay of 2 ms at the router. Assume no queuing delay. Find: (6)
   i) Number of packets required to transmit the file
   ii) Time taken to transmit one packet
   iii) Total transmission time for the entire file.

   c) Write short notes on the services offered by SCTP to the application-layer processes. (4)

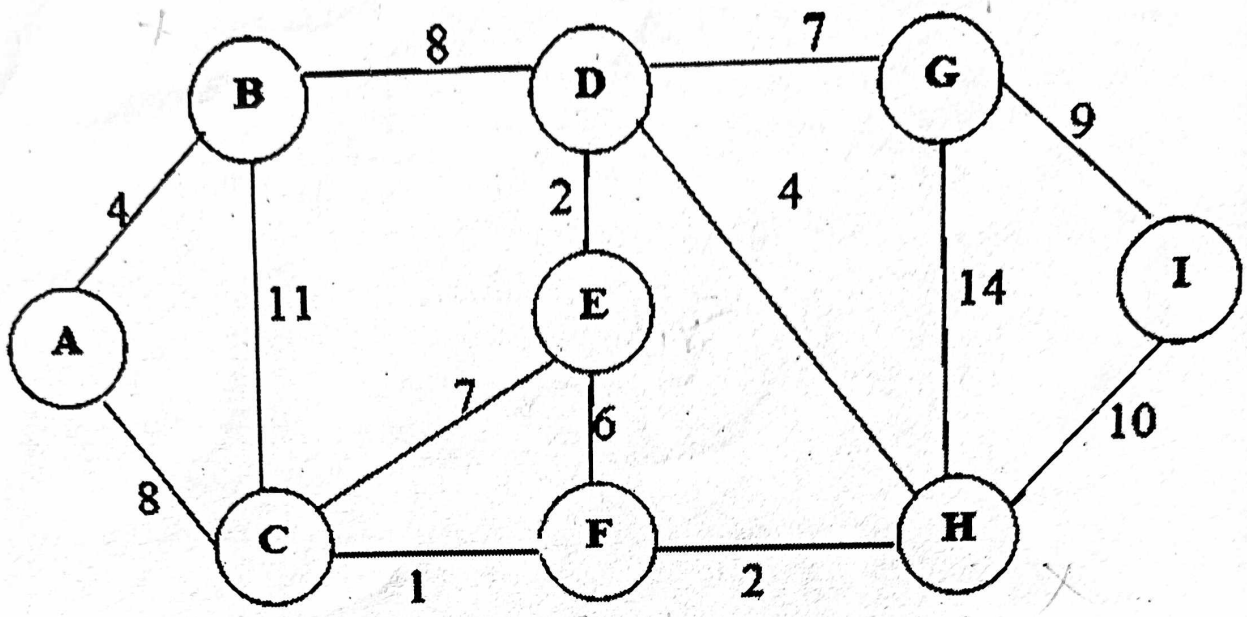
PART - B

Answer the following **1 x 20 = 20 Marks**

7. a) A 20 Kbps satellite link has a propagation delay of 400 ms. The transmitter employs the "Go Back N ARQ" scheme with N set to 10. Assuming that each frame is 100 bytes long, what is the maximum data rate possible? (5)

   b) Subnet the IP address 180.20.0.0 into 380 hosts in each subnet. Identify Class, Default Subnet Mask, Customized Subnet Mask. Also find out the No. of possible subnets, Usable IP Range, Network Address and Broadcast Address only for first 4 subnets. (5)

   c) Apply the Link State Routing Algorithm to find the shortest path. Assume node "A" as Root Node. Show the minimum spanning tree. (10)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SASTRA DEEMED UNIVERSITY

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End Semester Examinations

May 2025

Course Code: **INT313**

Course: **COMPUTER SYSTEM SECURITY**

QP No. **:U096-6** Duration: **3** hours

Max. Marks**:100**

PART - A

Answer all the questions **10 x 2 = 20 Marks**

1. Discuss whether the following is a violation of Confidentiality, Integrity or Availability.
   a) Eavesdropping data packets sent in the Local area Network
   b) Modifying the Password file in the Computer System.
   c) Sending excessing traffic into local area network
   d) Altering the entries of the records in Domain Name servers.
2. Define Computer system security using security of states and transitions.
3. What is an Integrity Policy? Give an example of an integrity Policy?
4. Discuss the standard concerned with the use of Trusted Systems.
5. State the Unwinding theorem for non-interference security in Computer systems.
6. Which Security Policy considers the history of past accesses to datasets?
7. What are the two types of covert channels found in computer systems?
8. What are Sandboxes? Give an example from Computer System usage.
9. What are the various types of Security Policies used in organizations?

10. What are the threats that require digital forensics investigation?

PART - B

Answer any Four questions **4 x 15 = 60 Marks**

11. a) Consider the following commands for an Access Control Matrix. Show the resulting access control matrix after executing all the commands:
Create subject UserA; Create subject User B; Create File1; Create Program1; enter read for [userA,File1]; Enter execute for [UserB, Program1]; enter write for [UserB, File1]; enter execute for [userA, Program1]. Enter own for [UserA, File1]; Enter own for [UserB,Program1]
Create the Access Control Lists for File1 and Program1. Create the capability lists for User A and User B. (8)

b) Discuss Discretionary Access Control Model, Mandatory Access Control Model and Role Based Access Control Model with examples. (7)

12. a) Discuss the Bell Lapadula Model's Simple Security Property and *-property using Security Labels and Categories Discuss the Bibas integrity Model using Security Labels and categories. (8)

b) Discuss how the Lipner's Integrity Matrix model combines the Bell Lapadula Model and Biba Models. (7)

13. The security of a computer System can be modelled using states and transitions. Consider a two-bit machine where two bits representing the HIGH and LOW bit. The system can be in any of the four states (0,0), (0,1), (1,0) and (1,1). Users issue commands to the system and the commands are executed in the order they are given. Users observe the outputs based on the certain privileges. For example, user A can see the output of both bits while the user B sees only the LOW bit. Define noninterference Secure property based on the outputs observed by the users for the above system when the commands issued are xor0 and xor1 by userA and userB. Consider the system where commands issued by User A affect only the HIGH bit and the commands issued by User B affect only the LOW bit. Is this system non-interference secure?

14. a) Discuss how information flows in the following Programming Language statements: x=y+z; (8)
(i) The statement $x=y+10$;
(ii) If $x = 1$, then $y=0$; else $y= 1$;
(iii) If $x=1$ then $y=a$; else $y=b$;
(iv) $x=y+z$

b) Discuss how covert channels may be created by observing the following activities in the Computer System. (i) By observing the average CPU utilization after a specified time period (ii) By observing the presence or absence of a file in a directory. (7)

15. a) Specify how the root user of a Unix System can protect data and processes from other users when both system programs and user programs are being run in the computer system.

b) Create a policy for User Authentication into the Computer System administered by the root user.

c) The root user has to ensure that the users comply with the permissions given to them for accessing files on the secondary storage. What procedure can be implemented to check users comply with the permissions given to them?

d) How can we ensure that user programs do not access files on the secondary storage if permissions are not given?

16. Consider the Confidentiality and Integrity of database Tables in a Relational DataBase systems. The DBMS manages tables and relationship between the tables on behalf of the user.
a) Discuss the authentication and authorization procedure for accessing the records in a table of a DBMS.

b) Assume the administrator wants to enforce confidentiality and integrity checks to some columns in a table. Discuss the procedure for enforcing this policy.

c) Discuss how we can infer violations of confidentiality and Integrity policies on the records of the DBMS.

d) Discuss how the auditing function can work for the above database management system.

PART – C

Answer the following **1 x 20 = 20 Marks**

17. Develop a Security Policy for an organization involved in software Development. There are various users who are developers, System administrators, installers and auditors. There are various types of workstations used for tasks such as Development, Production. The programmers cannot access the production systems and data. The software programs must be installed in the production system using a special procedure which is done only by the installers. The auditors monitor the installation procedure. The auditors will be given permission to read the files in the developers workstations as well as the production workstations. The System administrators only have access to the production system. Your task is create a multilevel policy with confidentiality and integrity constraints.

a) Create Security Labels for allowing read access to developer programs and data and production programs and data.

b) Create Security Labels for allowing write access to developer programs and data and production programs and data.

c) Assign Security clearances for reading and writing to developer programs and data and production programs and data.

d) Assign Security clearance for installing programs into the production system.

e) Verify all the confidentiality and Integrity requirements specified in the above description.

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End Semester Examinations

May 2025

Course Code: **INT314**

Course: **ARTIFICIAL INTELLIGENCE & LOGICAL REASONING**

QP No. **:U129-6**

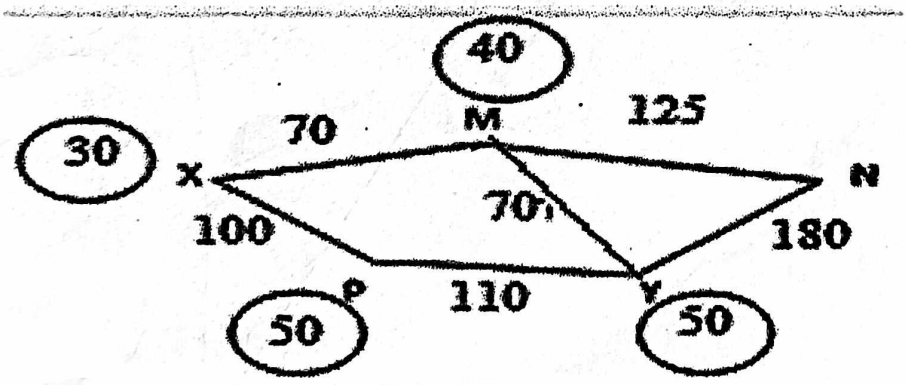
Duration: **3** hours

Max. Marks:**100**

PART – A

Answer any Four questions **4 x 20 = 80 Marks**

1. Your Bot needs to reach Mall in a city from Airport (X). Apply A* search to get minimal cost. Critic the process by explaining concepts



2. Illustrate the components of planning system.

3. a) A product manufactured in a factory may turn out to be defective because of either a machine malfunction and/or human error during production. The joint probabilities for the outcomes are as follows:

The probability of **Defective**:

- Machine malfunction and Human error :0.05
- Machine malfunction but No Human error :0.03
- No Machine malfunction but Human error :0.02
- Neither Machine malfunction nor Human error :0.01

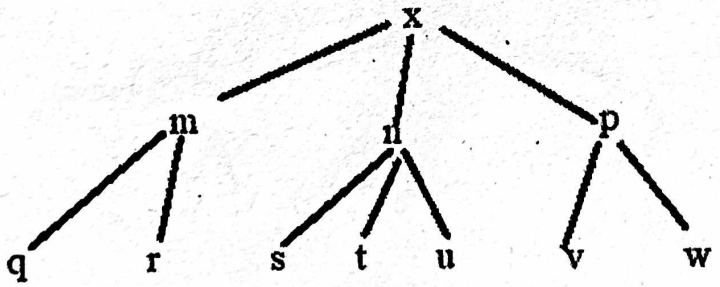
For a **non-defective** product:

- Machine malfunction and Human error :0.02
- Machine malfunction but No Human error :0.01
- No Machine malfunction but Human error :0.04
- Neither Machine malfunction nor Human error :0.82.

Find out probability of defect due to malfunction and the probability that there was no human error given that the product is defective. (10)

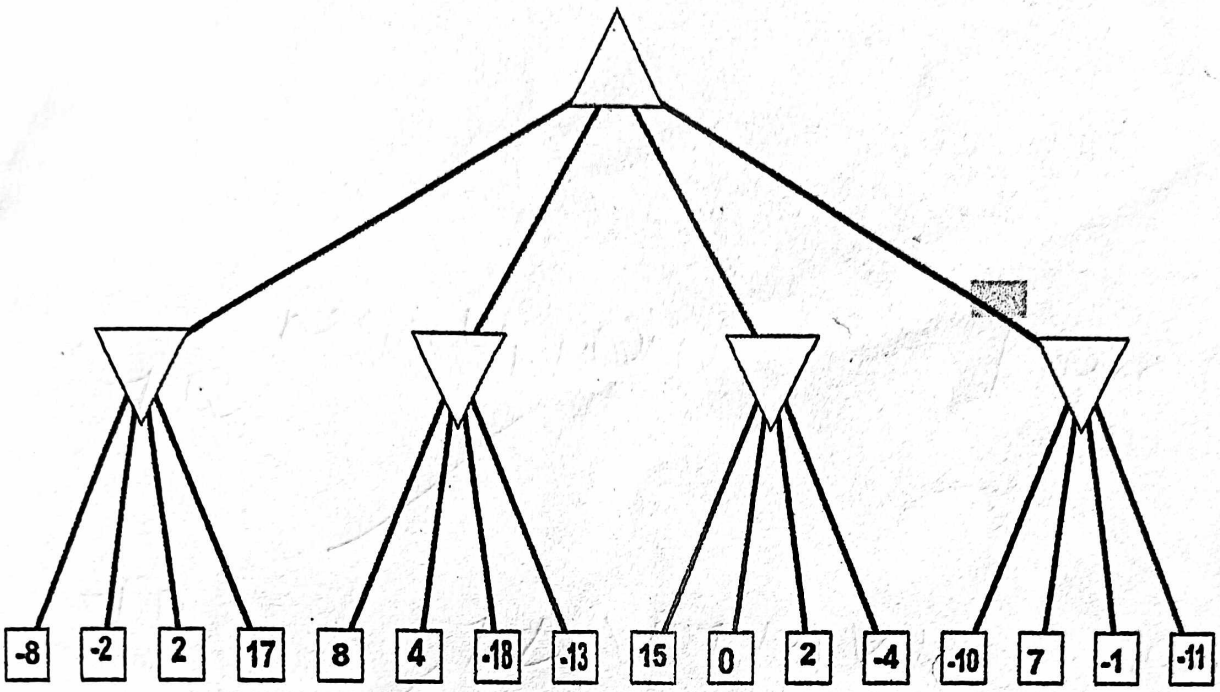
b) Elaborate unification algorithm. (10)

4. a) Apply Depth First Search and analyze the searching process in a table using the order of fringe queue. Goal is 'u'. (10)



b) Sun and Moon are playing Chess game. They have decided to follow the strategy of min-max algorithm. As a friend you need to articulate the steps and the logic behind this algorithm enable them to choose the winning path. Give a part of sample tree. (10)

5. a) Apply alpha beta pruning to the following tree and find the pruned branches along with alpha beta values. (10)



b) Illustrate resolution by refutation steps. (10)

6. a) Illustrate the representation of instant and 'isa' relationship of FOL. (10)

b) Summarize the components of Expert Systems. (10)

PART – B

Answer the following **1 x 20 = 20 Marks**

7. a) The number non-attacking positions for each queen in 8 queen problem are given (for 4 strings of positions.). They are 37,44,26,11. Estimate and Define fitness function. (5)

b) Define Manhattan distance and Calculate Manhattan distance for the following. (5)

Start node.

3		6
8	4	1
5	2	7

Goal node

6	5	3
2	1	4
	7	8

c) Discuss the Action, Precondition and Effect of PDDL with example. (5)

d) Develop FOL axiom for the following sentence. (5)
"Everyone student who is taking AI is cool"
"Rishi takes either Analysis or ML"
"Mr.Max owns two houses"

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End Semester Examinations

May 2025

Course Code: **COM117**

Course: **FINANCIAL & COST ACCOUNTING**

QP No. **:U178-6**

Duration: **3** hours

Max. Marks**:100**

PART – A

Answer all the questions **10 x 2 = 20 Marks**

1. Define the term assets.
2. Explain capital and revenue expenditure with examples.
3. Identify two common methods of calculating depreciation.
4. Summarize the concept of a cost unit.
5. Distinguish between job costing and contract costing.
6. Mention the elements of cost.
7. Define Marginal costing.
8. Outline the key features of Zero-Based Budgeting.
9. Explain the significance of IFRS.
10. State the meaning of environmental Audit.

PART - B

Answer all the questions **4 x 15 = 60 Marks**

11. Ganesh is a trader dealing in textiles. For the following transactions, pass journal entries for the month of January, 2023.

Jan 1. Commenced business with cash ₹ 70,000
2 Purchased goods from X and Co. on credit ₹ 30,000
3 Cash deposited into bank ₹ 40,000
4 Bought a building from L and Co. on credit ₹ 95,000
5 Cash withdrawn from bank for office use ₹ 5,000
6 Cash withdrawn from bank for personal use ₹ 4,000
9 Goods sold for cash ₹ 3,000
10 Goods purchased from Vijay ₹ 2000
12 Stationery purchased for and paid through net banking ₹ 500
15 Bank charges levied ₹ 200
17 Dividend directly received by bank ₹2,000
18 Money withdrawn from ATM ₹ 3,000
20 Salaries paid through ECS ₹ 6,000
23 Cricket bats donated to a trust ₹ 1,000
25 Sold goods to Keerthana, who made the payment through credit card ₹ 10,000.

(OR)

12. (a) Explain the significance of ratio analysis in financial statement interpretation. (5)
    (b) Explain the various concepts and conventions of GAAP. (10)

13. (a) From the following particulars prepare cost sheet: (8)

Particulars	Amount
Direct materials	8,000
Direct wages	6,000
Direct expenses	2,500
Administrative overheads	4,000
Factory overheads	5,000
Sales	40,000

(b) Two components X and Y are used as follows: (7)

Particulars	X	Y
Normal usage per week	150 Units	200 Units
Re-order quantity	900	1,500
Maximum usage per week	225	250
Minimum usage per week	75	100
Re-order period(week)	12 to 18	6 to 12

Calculate for each component (i) Re-order level (ii) Minimum level (iii) Maximum level (iv) Average level.

(OR)

14. (a) Distinguish between financial accounting and cost accounting. (5)
(b) The following details pertain to the production department of a factory. (10)

Particulars	Amount (₹)
Material consumed	60,000
Direct wages	40,000
Machine hours	50,000
Labour hours worked	25,000
Factory overhead relating to the department	50,000

Calculate overhead absorption rates under different possible methods from the above details.

15. Explain the advantages and Limitations of Standard costing.

(OR)

16. (a) Prepare a production budget for Somu Ltd., from the following data: (8)

Particulars	Product		
	X	Y	Z
Stock on 1.1.17 (Units)	5,000	6,000	4,000

Stock on 31.12.17 (Units)	7,000	5,000	7,000
Estimated sales during the year 2017(Units)	70,000	60,000	80,000

(b) A company shows the following results for two periods: (7)

Period	Sales ₹	Profit ₹
1	1,40,000	15,000
2	1,60,000	20,000

Compute: (i) Profit volume ratio (ii) Fixed cost (iii) BEP sales.

17. Assess the advantages of XBRL in financial reporting.

(OR)

18. A company has recently implemented an ERP system for financial reporting. As an auditor, how would you evaluate the reliability and accuracy of financial data generated by the ERP system?

PART – C

Answer the following **1 x 20 = 20 Marks**

19. (a) Prepare trading and profit and loss account and Balance sheet from the following ledger balances presented by P. Sen as on 31st March, 2021. (12)

Particulars	Amount (₹)
Purchases	10,000
Wages	600
Freight inwards	750
Carriage outwards	400
Advertisement	500
Cash	1,200
Machinery	8,000
Debtors	2,250
Bills receivable	300
Opening stock	1,000

Sales	15,100
Commission received	1,900
Rent received	600
Creditors	2,400
Capital	5,000

Additional information:

- Stock on 31st March, 2021 ₹ 2,100
- Outstanding wages amounted to ₹ 200
- Advertisement paid in advance for ₹ 150
- Commission received in advance ₹ 400

(b) Explain the steps involved in audit of computerised accounting. (8)

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SASTRA DEEMED UNIVERSITY

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End Semester Examinations

May 2025

Course Code: **MGT222**

Course: **BEHAVORIAL ECONOMICS**

QP No. **:U265-6**

Duration: **3** hours

Max. Marks:**100**

PART – A

Answer all the questions **10 x 2 = 20 Marks**

1. How does behavioural economics help in policymaking?
2. What is the hot-hand fallacy?
3. How does hyperbolic discounting affect financial planning?
4. Explain the Allais paradox.
5. Define the gambler's fallacy.
6. What is probability distortion?
7. Infer the 'decoy effect'.
8. What is a dominant strategy in game theory?
9. Interpret the sunk cost fallacy.
10. Relate an example of an intertemporal choice problem.

PART – B

Answer all the questions **4 x 15 = 60 Marks**

11. Examine the role of cognitive biases in decision-making and provide relevant examples of common biases observed in consumer behavior.

(OR)

12. Explain the concept of "prospect theory" and its impact on how people make decisions under uncertainty.

13. Analyse how social preferences, like fairness or reciprocity, influence individual decision-making.

(OR)

14. Discuss how concepts like "nudging" or behavioural interventions influence choices without restricting the freedom of choice.

15. Determine how the real-world examples of irrational decision-making, challenge the predictions of the neoclassical model in marketing.

(OR)

16. Analyse the effect of bounded rationality and social influence on consumer behavior.

17. Explain the use of game theory in strategic business decisions. (or)

(OR)

18. Discuss how time-inconsistent preferences affect economic planning.

PART - C

Answer the following **1 x 20 = 20 Marks**

19. The Retirement Savings Dilemma.

How much do you need to save for retirement and where should you invest it? Financial research recommends drawing only 3%-4% annually from your retirement funds to be relatively confident of not running out of funds before you run out of life. This necessitates accumulating an amount most people would consider quite daunting.

Anjali, a 30-year-old software engineer working in Hyderabad, earns ₹15 lakh per annum. She is financially independent, enjoys traveling, and frequently spends on luxury items. She has started thinking about her financial future after witnessing a close friend struggle financially after losing a job. Her employer offers an Employee Provident Fund (EPF) plan, but contributions are optional beyond the statutory minimum. She also has access to mutual funds and insurance-based retirement plans. However, Anjali faces a dilemma regarding how much to save and where to invest. She is considering the following investment options:

Option A: Conservative Approach

- Invests 70% of her savings in a low-risk government bond with a guaranteed 5% annual return.
- Keeps 30% in a fixed deposit, which earns 6% but is taxable.
- This provides stability but might not keep up with inflation.

Option B: Balanced Approach

- Invests 50% in government bonds and 50% in an index fund with historical returns of 10-12% but market fluctuations.
- This offers better growth potential while keeping some stability.

Option C: Aggressive Growth Approach

- Invests 80% in equity mutual funds (expected return: 12% but with high volatility).
- Allocates 20% in gold and real estate for diversification.
- This could generate high returns but comes with a risk of market downturns.

a) Anjali's decision a classic case of choice under uncertainty. Justify, how Expected Utility Theory (EUT) and Prospect theory apply to Anjali's choices.

b) Examine the consequences of delaying investment and suggest suitable measures to Anjali to overcome the present bias.

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End Semester Examinations

May 2025

Course Code: **EIE329M**

Course: **CONTROL AUTOMATION**

QP No. :**U016-M**

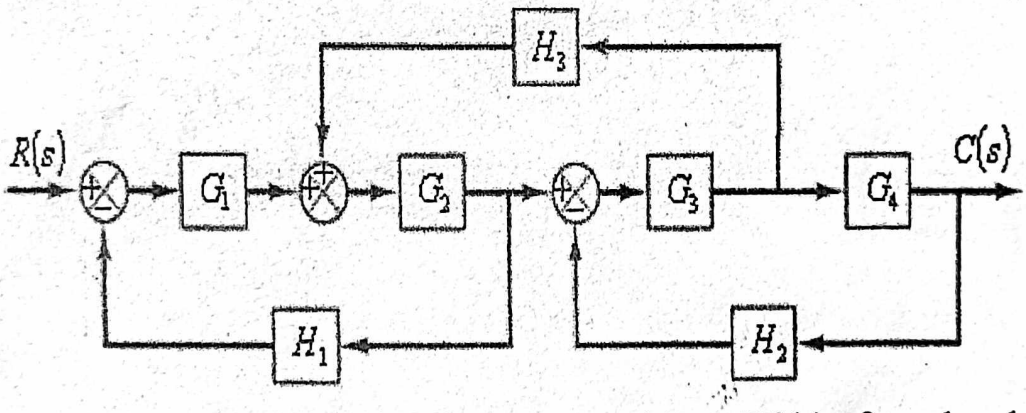
Duration: **3** hours

Max. Marks:**100**

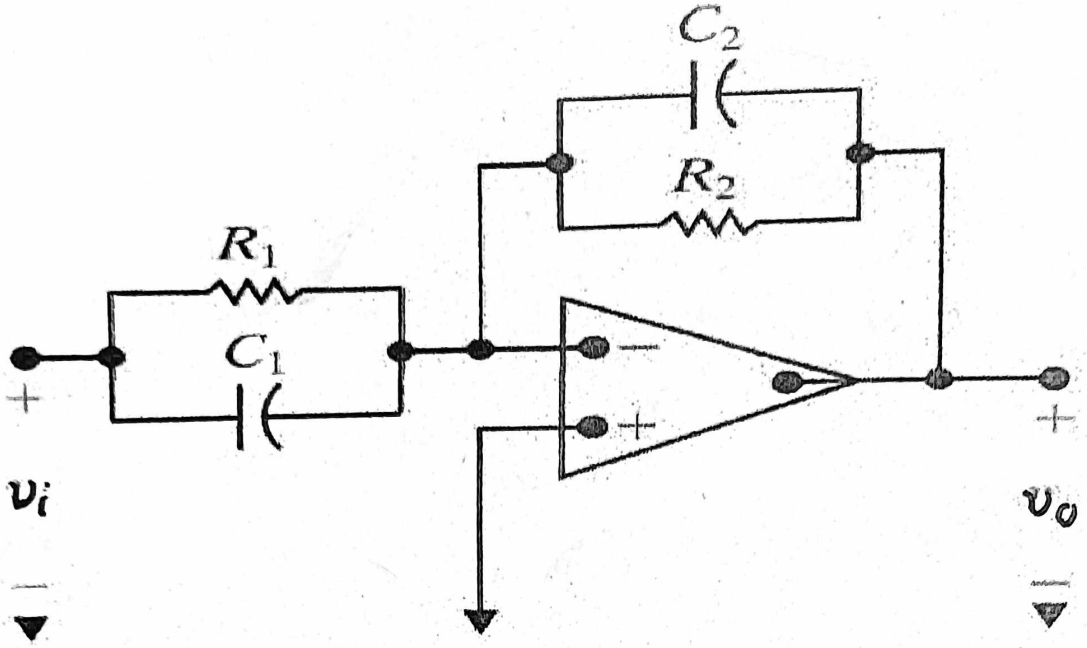
PART – A

Answer any FOUR questions **4 x 20 = 80 Marks**

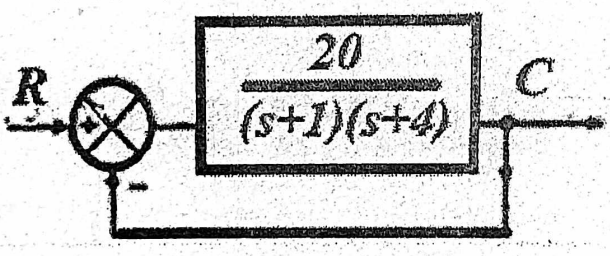
1. (a) Find the transfer functions C(s)/R(s) for the given block diagram. (15)



(b) Derive the transfer function V0(s) / Vi(s) for the lag-lead network given below.



2. (a) For the system shown below, obtain the closed loop transfer function and the damping ratio, natural frequency. Also obtain the output response if the system is subjected to a unit step input. (12)



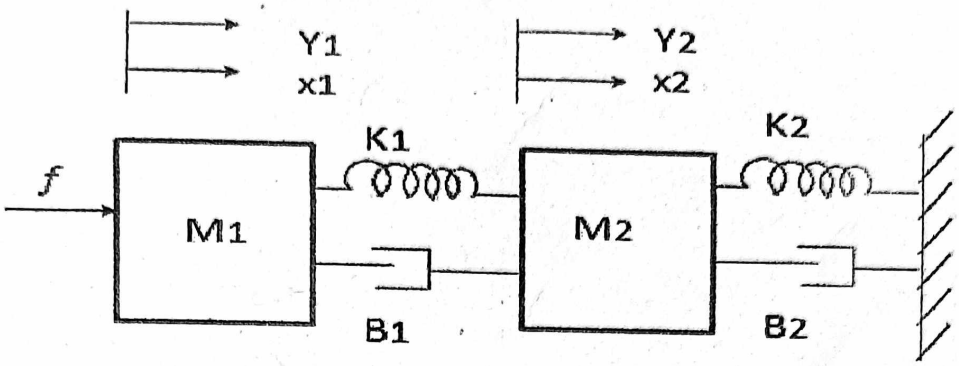
(b) In the above system, consider feedback element H(s) = (s+3) and find the Routh stability. (8)

3. The open loop transfer function of a control system is given as

$$G(s)\,H(s) = \frac{K}{s(s+1)(s+10)}$$

Draw the root locus and find the stability limit of K.

4. Obtain the SS model for the mechanical system shown.



5. (a) Find the state feedback gain matrix if the desired closed loop poles are located at -5, -5. Find by direct method.

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -2 & -3 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + \begin{pmatrix} 0 \\ 1 \end{pmatrix} u$$

(b) Design the full order state observer. The desired closed loops are located at -5, -5 where $A = \begin{pmatrix} -1 & 1 \\ 1 & -2 \end{pmatrix}$ ***and*** $C = \begin{pmatrix} 1 & 0 \end{pmatrix}$

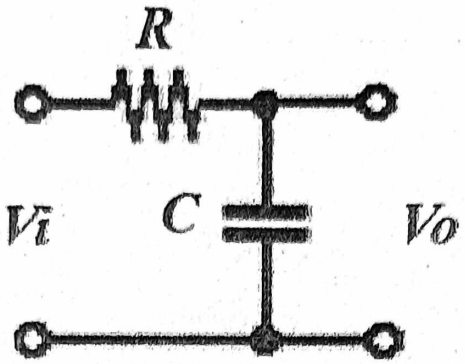
6. (a) In a factory with 4 machines; every machine has its own start and stop push button switches. With the concept of interlocking develop ladder diagram such that only one machine can at a time. (10)

(b) In the above problem, modify the logic such that any three or two or one can run at a time for which show the respective developed ladder logic diagram. (10)

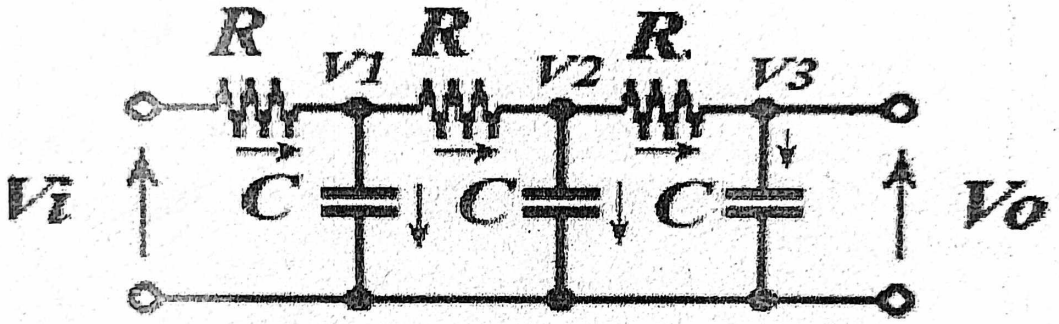
PART – B

Answer the following **1 x 20 = 20 Marks**

7. (a) Obtain the transfer function model for the RC network given. (4)



(b) Obtain the state space model for the given system. (12)



(c) Find the Routh stability criteria if the characteristics equation is

$$5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 100 = 0 \qquad (4)$$

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