SMT. INDIRA GANDHI COLLEGE OF ENGINEERING

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4571113

Date: 28/10/2025

Subject Name: Machine Learning & Block Chain

Max Marks: 80

Subject Code:IoTCSBCC701 Branch:IOTCSBC

Sem: VII

Duration: 03 hours

Note:

1) This is one of possible solution/marks schemes. There might be multiple ways to write answers while keeping concepts intact.
2) Presentation Skill carries weightage within distributed marks.
3) Neatly labeled suitable diagrams carry weightage

		CO	Marks
Q.1	**Answer the following (any three)**	**1**	**(15)**
a.	Describe methods to deal with missing data. Name of method:...1 explanation....3 example.....1		5
b.	What is feature selection and why is it important? definition, need justification.....1+2+3		5
c.	Describe the importance of training-test data partitioning. definition of data partition, importance, process....1+2+2		5
d.	Discuss any two Python libraries used for Machine Learning. two names, application,example...1+2+2		5
Q.2	**Answer the following (any three)**	**2**	**(18)**
a.	How does Random Forest work to prevent overfitting? definition, working, prevention 1+2+2		6
b.	Describe the working of Gradient Boosting in ensemble models. Definition, working,example....1+3+1		6

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c. Illustrate PCA with an example and explain the selection of principal components 6

Define PCA, example, selection process of principal components...1+1+4

d. Explain the working of Gaussian Naive Bayes with an example. 6

Definition, working, example....1+4+1

Q.3 Answer the following (any three) **3 (15)**

a. Describe the steps involved in backpropagation. 5

define, working, diagram...1+3+1

b. Explain the architecture of a simple perceptron with a diagram. 5

diagram, working ....2+3

c. List and discuss any two major challenges of deep neural networks, which are encountered during training and how they can be mitigated? 5

list of two cahhelnges...2 mitigation....3

d. Differentiate traditional machine learning models from Artificial Neural Networks (ANN). 5

diagrams....2 differences....3

Q.4 Answer the following (any three) **4 (15)**

a. Explain Byzantine Generals' Problem and its relevance in blockchain consensus. 5

define Byzantine Generals' Problem, Justification of relevance in blockchain..2+3

b. Discuss the working and importance of hash functions in blockchain. 5

define, working, importance...1+3+1

c. Explain Merkle Tree architecture and working with a diagram 5

Define, architecture/diagram working ..1+1+3

d. Draw & explain decentralized system with suitable diagram. 5

Definition, diagram, explanation ...1+1+3

Q.5 Answer the following (any two) **5 (12)**

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a. Discuss the advantages and challenges of using DApps in real-world applications 6

define DApps in real-world applications, advantages, challenges... 2+2+2

b. Explain the role of consensus in achieving trust in blockchain 6

Need of trust , define consensus , process of achieving trust 1+1+4

c. Discuss how blockchain addresses privacy .Explain with suitable examples. 6

definition of privacy...1 role of blockchain....4 ... example..1

Q.6 Write note on (any one) **6 (5)**

a. Blockchain technology in preventing healthcare fraud 5

BC technology, healthcare fraud, prevention..1+1+3

b. b. Overview of Cryptocurrency.

definition, flow diagram/figure, application example 1+2+1+!

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4571123

Subject Name : Edge and Fog Computing

Date: 30/10/2025

Subject Code: IoTCSBC702

Branch: CSE- IoT (CSBC)

Sem: VII

Duration: 3 hrs

Max Marks: 80

Note:

1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following:**	CO1	(15)
a.	Describe edge computing reference architecture and list it's critical components.		10
b.	Evaluate the major challenges faced in implementing Edge Computing and suggest possible solutions.		05
	(OR)		
	Analyze the challenges of maintaining data consistency and synchronization across disconnected edge nodes.		05
Q.2	**Answer the following (any two)**	CO2	(20)
a.	Evaluate the trade-offs between full virtualization, containerization, and unikernel approaches for edge computing. Analyze resource overhead, security isolation, and deployment flexibility for each approach		10
b.	Analyze the challenges of maintaining data consistency and synchronization across disconnected edge nodes. Design a conflict resolution mechanism for distributed edge databases.		10
c.	Compare AWS IoT Greengrass, Azure IoT Edge, and Google Cloud IoT Edge across the following dimensions: a) Container orchestration capabilities and Kubernetes integration b) Machine learning inference support and model deployment mechanisms c) Security features including device authentication and data encryption d) Offline operation capabilities and data synchronization strategies		10
Q.3	**Answer the following**	CO3	(15)
a.	Define task offloading in edge computing. Give an example of when an edge device would offload a task to the cloud. Also List four factors that determine whether a task should be processed locally or offloaded to the cloud.		10
b.	List three challenges of running machine learning models on resource-limited edge devices.		05
	(OR)		
	Analyze data timestamping and synchronization challenges in distributed edge computing environments.		05
Q.4	**Answer the following (any two)**	CO4	(10)
a.	Analyze scenarios where fog computing is preferred over cloud computing. Discuss bandwidth savings, latency reduction, and operational cost implications.		05
b.	Discuss data management in Fog computing.		05

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c. Explain the concept of "bringing computation closer to data sources" in fog computing with a practical example. **05**

Q.5 Answer the following (any two) **CO5** **(10)**

a. Explain the key performance evaluation metrics used in Fog computing and analyze their impact on system efficiency. **05**

b. Discuss different middleware and software platforms for Fog Computing **05**

c. Write a short note on IIoT. **05**

Q.6 Answer the following (any two) **CO6** **(10)**

a. Describe how edge computing helps in predictive maintenance for industrial equipment. Give a specific example. **05**

b. Analyze smart home applications of edge computing. How does it improve performance and security of IoT devices? **05**

c. Analyze how edge computing helps in smart grid management. Explain how it monitors energy consumption and prevents blackouts with a real-world example. **05**

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME) QP Code: 4571142

Date: 04/11/2025

Subject Name: Enterprise IoT Cyber Security
Subject Code: IoTCSBCD7023 Branch: IoT&CSBC
Duration: 3 hours
Sem: VII
Max Marks: 80

Note:
1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following (any two)**	1	(14)
a.	Describe the primer on TVR - threat, vulnerability and risk.		7
b.	List out the security requirements in IoT architecture?		7
c.	Discuss the stages of the IoT device life cycle.		7
Q.2	**Answer the following**	2	(15)
a.	Write note on : i) Scrum ii) Kanban		10
b.	i) State the mitigation methods in Wannacry cyber attack on industrial control systems		5
	or		
	ii) Explain the different frameworks and methodology in Agile Development.		5
Q.3	**Answer the following (any two)**	3	(12)
a.	Write note on : i) MQTT ii) SMQTT		6
b.	What are the methods for IoT node authentication?		6
c.	Explain the importance of cryptographic controls.		6
Q.4	**Answer the following (any two)**	4	(12)
a.	What are the different authentication credentials?		6
b.	Describe the components of 802.1x.		6
c.	Explain the Oauth 2.0 authorization protocol.		6
Q.5	**write short note on (any three)**	5	(15)
a.	Challenges for IoT compliance		5
b.	(PbD) Privacy by design principles		5
c.	Privacy Engineering recommendations		5
d.	(PIA) Privacy impact assessment		5
Q.6	**Answer the following (any two)**	6	(12)
a.	Specify the cold chain management in implementation of Pfizer Covid 19 vaccine distribution .		6
b.	Discuss the application of Enterprise IoT in the cleaning service industry.		6
c.	Explain the procedure of Intelligent Iot tracking		6

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code:4571152

Subject Name: Cyber Security and Laws

Date: 06/11/25

Subject Code: ILO7016 Branch: CSE IOT CSBC Sem: VII

Duration: 3 Hours Max Marks: 80

1) **Note:**
2) Attempt all questions
3) Assume suitable data wherever necessary.
   Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following (any two)**	**CO1**	**10**
a.	Explain the role of the internet in the evolution and proliferation of cybercrime.		5
b.	How does cybercrime impact the confidentiality, integrity, and availability of information?		5
c.	Identify the challenges of addressing cybercrime on a global scale.		5
Q.2	**Answer the following (any four)**	**CO2**	**20**
a.	How can individuals and organizations defend against social engineering attacks?		5
b.	Explain the strategies for detecting and mitigating botnet threats.		5
c.	What are the new opportunities and challenges for cybercriminals with the rise of mobile and wireless devices?		5
d.	Provide examples of recent credit card fraud incidents involving mobile and wireless devices.		5
e.	Discuss how do attackers gather intelligence and conduct reconnaissance before launching a cyber attack?		5
Q.3	**Answer the following (any two)**	**CO3**	**10**
a.	Discuss the psychological tactics used by phishers to trick victims into divulging sensitive information.		5
b.	Explain the difference between a DoS attack and a DDoS attack.		5
c.	Define identity theft and explain the different methods used by cybercriminals to steal identities.		5
Q.4	**Answer the following (any two)**	**CO4**	**16**
a.	How do cyber laws address the issue of contract formation and acceptance in online transactions?		8
b.	Explain the role of international cooperation in combating cybercrime.		8
c.	Describe the concept of digital rights management (DRM) and its legal implications		8
Q.5	**Answer the following (any two)**	**CO5**	**12**
a.	How does the IT Act, 2008 amend the penalties for cyber offenses, and what are the new provisions?		6
b.	Explain the adjudication process for cybercrime cases under the IT Act, 2000.		6
c.	Describe the changes introduced by the IT Act, 2008 in the appeals process.		6

PTO

		CO6	12
Q.6	**Answer the following (any two)**		
a.	What are the key provisions of SOX that relate to cybersecurity and information security?		6
b.	Identify the Health Insurance Portability and Accountability Act (HIPAA) and what are its main goals?		6
c.	Explain the PCI DSS and why was it established?		6

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME) QP Code:4571131

Subject Name: Advance Cloud Computing and Security Date: 08/11/2025
Subject Code: IOTCSBCDLO7011 Branch: CSE(IOTCSBC) Sem: VII
Duration: 3 Hrs Max Marks: 80

Note:
1) **Attempt all questions**
2) **Assume suitable data wherever necessary.**
3) **Figures to the right indicate full marks.**

		CO	Marks
Q.1	**Solve any two**	CO1	(14)
a.	Discuss the key aspects of Défense in Depth		7
b.	Explain the least privilege and discuss its challenges.		7
c.	Describe the concept of Non-repudiation		7
Q.2	**Answer the following. (Any Three)**	CO2	(15)
a.	Elaborate OS Hardening and minimization		5
b.	Compare and Contrast SAST and DAST.		5
c.	Define attack vector? List out common attack vectors and explain the ways of protection		5
d.	Differentiate between Verified and measured boot.		5
Q.3	**Answer the following (Any two)**	CO3	(12)
a.	What are the essential security measures taken and best practices used for implementation of security in Virtual Data centers		6
b.	Summarize the key stages involved in developing a data retention policy for an organization		6
c.	Prepare an outline for archiving procedures for tenant data		6
Q.4	**Solve any two**	CO4	(12)
a.	Classify IAM standards and protocols.		6
b.	Write a short note on MFA and SSO.		6
c.	Explain the various phases of Lifecycle process model of IAM.		6
Q.5	**Answer the following**	CO5	(15)
a.	Design Cloud Disaster Recovery Plan for healthcare industry and build its Solution		10
b.	List out the challenges in achieving Internal Policy Compliance within a large organization		5
	OR		
c.	Discuss the important steps in the procedures of cloud disaster recovery.		5
Q.6	**Solve the following (Any two)**	CO6	(12)
a.	Breakdown the common cloud-native security tools and their functions.		6
b.	Explain 3 R's and 4 Cs of Cloud Native Security		6
c.	Elaborate the core functionalities of a Cloud-Native Application Protection Platform.		6

QP code : 10094143

BE Sem VII Electrical R-19 C scheme

(3 Hours) **Total Marks: 80**

NOTE
1. Question number 1 is compulsory
2. Attempt any three from the remaining
3. Figures to right indicates full marks
4. Assume suitable data if necessary and mention the same

1. Attempt any four of the following :- **20**

a) Explain why frequency control loop and voltage control loop are not interacting **05**

b) Explain different properties of Ybus **05**

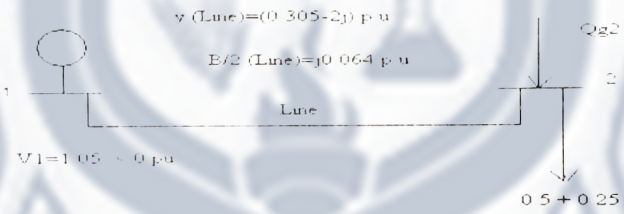
c) Define power system stability and classify it on the basis of nature of disturbance **05**

d) State assumptions made in transient stability studies **05**

e) Admittance matrix of a 20-bus power network has 80% elements as zero. How many minimum number of transmission lines are there in this system **05**

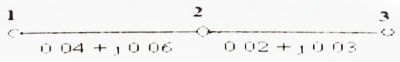
2. **20**

a) A simple two-bus power system is shown in fig **10**



$|V_2| = 1.0$ p.u (Bus 2 is PV bus). Obtain δ_2 and Q_{g2} at the end of first iteration of N-R method.

b) For the network shown in figure obtain the complex bus bar voltage at bus 2 at the end of the first iteration. Use the Gauss seidal method. Line impedances are given in pu Given Bus 1 is slack bus with $V_1 = 1 \angle 0$ $P_2 + j\,Q_2 = -5.6 + j\,1.46$ Assume $V_3^0 = 1.02 \angle 0$ $V_2^0 = 1 \angle 0$ **10**



3. **20**

a) Determine the economic operation point for three thermal units delivering a total load of 600 MW with considering generator limit **10**
Unit1 Pmax=600 MW Pmin=150 MW
$F1(P_1)=550+7.7\ P_1+0.00165\ P_1^2$
Unit2 Pmax=500 MW Pmin=125 MW
$F2(P_2)=300+7.88\ P_2+0.002\ P_2^2$
Unit3 Pmax=600 MW Pmin=75 MW

$F3(P_3)=80+7.99\ P_3+0.005\ P_3^2$

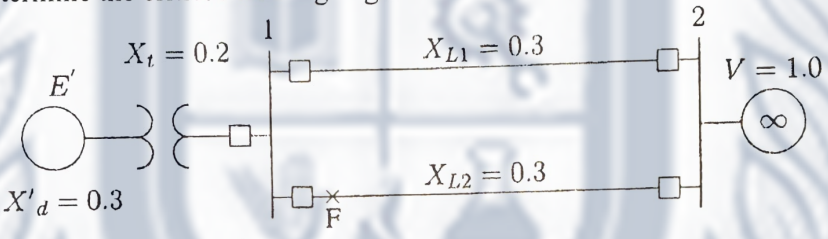
b) The incremental fuel cost of a plant, three-generation unit is IC1=10+0.4P1, IC2=40+0.3P2, IC3=50 , All units operated all the time if the plant is operating on economic load dispatch to supply the total demand of 750MW.50MW≤P1,P2,P3≤300MW What is the power generated by each unit? **10**

20

4. **20**

a) Derive Equal area criterion **10**

b) A 50 Hz synchronous generator having inertia constant H=5 MJ/MVA and a direct axis transient reactance xd' = 0.3 p.u is connected to an infinite bus through a purely reactive circuit as shown in the figure below. Reactances are marked on the diagram on a common system base. The generator is delivering real power Pe=0.8 pu and Q=0.074 pu to the infinite bus at voltage v=1 pu. A temporary three phase fault occurs at the sending end of the line at point F. When the fault is cleared, both the lines are intact. Determine the critical clearing angle and the critical clearing time **10**



5. **20**

a) Draw turbine speed governor system and explain briefly 4 major parts in it **10**

b) Explain dynamic response of change in frequency for step change in load of an isolated power system. How dynamic response changes with integral control action **10**

6. Write short notes on **20**

a) power pool and its advantages and disadvantages **10**

b) System state classification of power system security **10**

QP code : 10097141

BE sem VII R-19 C scheme. Electrical

Time: 3 hrs **Marks:80**

Instructions:

- Question No: 1 is compulsory.
- Answer any three from the remaining six questions.
- Figures to the right indicate full marks.
- Answers to questions should be grouped and written together.

Solve any four

Q1	**a)**	What are the impacts of low power factor in an HVDC system?	**05**
	b)	What are the causes of overlap in a converter and evaluate the angle at which inversion starts for a converter with overlap angle less than 60°?	**05**
	c)	Prove that ratio of DC power to AC power in DC and AC transmission respectively is 1.5 if power factor of AC is 0.945	**05**
	d)	What are the causes and effect of arc back	**05**
	e)	What are the features of HVDC Transmission for Offshore Wind Farms?	**05**
Q2	**a)**	Illustrate with neat diagram the classification of HVDC links. And give one application for each links.	**10**
	b)	Illustrate with neat diagram the major components of HVDC system.	**10**
Q3	**a)**	Develop the equivalent circuit of HVDC rectifier and draw the output voltage waveform.	**10**
	b)	"Converter consumes reactive power" Justify the statement. Draw all supporting voltage and current waveforms and phasor diagrams.	**05**
	c)	A three phase rectifier fed from a transformer with nominal voltage rating of 220 kV/ 110 kV. If the primary voltage is 230 kV and effective turns ratio T is 0.48, estimate the effective commutating reactance, power factor and reactive power at the primary side of the transformer. Direct current is 2000 A, ignition delay angle α is 20° and commutation overlap angle μ is 18°	**05**
Q4	**a)**	Develop the control characteristics of HVDC system under normal and abnormal conditions.	**10**
	b)	Develop the control characteristics of HVDC system for power reversal.	**10**
Q5	**a)**	Illustrate the equidistant pulse generation schemes used in HVDC system. What are the advantages and disadvantages?	**06**
	b)	Justify with appropriate reason why there is a minimum and maximum current limit in HVDC control scheme.	**04**
	c)	Illustrate with neat voltage and current waveforms the single commutation failure.	**10**
Q5	**a)**	Which device is being used to isolate the rectifier in an HVDC system affected by a valve fault? Show with neat waveform how the current transfer occurs from faulty rectifier to the device and inverter to the device	**10**
	b)	What are the causes of over currents in HVDC and illustrate how the system is protected?	**10**
Q6	**a)**	Illustrate the causes and effect of harmonics in HVDC system	**10**
	b)	Illustrate various methods adopted in AC side and DC side to reduce harmonics in HVDC system	**10**

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QP code : 10098182

BE sem VII Electrical R-19 C scheme

3 hours **80 Marks**

N. B. :

1. Question No. 1 is compulsory
2. Attempt any **THREE from Q2 to Q6** questions
3. Use illustrative diagrams wherever required

Q1) Attempt any **FOUR** questions

a) A shell and tube heat exchanger is used to increase the temperature of furnace oil from a temperature of 60 °C to 120 °C using steam as the heating medium. The oil flow rate is 3500 kl/hr. The density of furnace oil is 0.89 kg/liter. Calculate the amount of steam required in t/hr to heat the furnace oil, if the specific heat of furnace oil is 0.5 kCal/kg°C. The total enthalpy of steam is 2733 kJ/kg. The condensate is leaving the heat exchanger at 397 kJ/kg. **05**

b) State any five factors on which capacity of boiler is decided? **05**

c) A paint drier requires 75.4 m^3/min of air at 93°C, which is heated in a steam-coil unit. How many kg of steam at 4 bar does this unit require per hour? The density of air is 1.2 kg/m^3 and specific heat of air is 0.24 kcal/kg°C. The ambient temperature is 32°C. **05**

Pressure bar	Temperature °C	Enthalpy kcal/kg		
		Water	Evaporation	Steam
4	143	143	510	653

d) State any five benefits of Power Factor (PF) improvement? **05**

e) Illustrate the purpose of using insulation in thermal systems. What are the benefits of providing insulation? **05**

Q2) **a)** Develop a table using a CUSUM technique to calculate energy savings for 8 months period for a production level of 2000 MT per month. Refer to field data given in the table below. **10**

Month	Actual SEC kWh/MT	Predicted SEC kWh/MT
May	1225	1250
June	1227	1250
July	1240	1250
August	1245	1250
September	1238	1250
October	1257	1250
November	1248	1250
December	1264	1250

b) Define Energy Monitoring and Targeting. State the elements of Energy Monitoring and Targeting. Illustrate the role of Monitoring and Targeting towards achieving energy efficiency. **10**

Q3) **a)** A 3 phase, 415 V, 75 kW induction motor is drawing 48 kW at a 0.7 PF. Calculate the capacitor rating requirements at motor terminals for improving PF to 0.95. Also, calculate the reduction in current drawn and kVA reduction, from the point of installation back to the generating side, due to the improved PF at the operating voltage of 415 V. **07**

b) An economizer was installed in the furnace-oil-fired boiler. The following are the data monitored after the economizer was commissioned. **07**
Air to fuel ratio = 18
Evaporation ratio (Steam generated per kg of fuel) of the boiler = 12.5
Specific heat of flue gas = 0.25 kcal/ kg°C
Condensate recovery in the plant = Nil.
Calculate the drop in the flue gas temperature for the rise in temperature of feed water in an economizer by 34.2°C.

c) List the steps to evaluate performance of lighting system. **06**

Q4) a) Illustrate the main features of Energy Conservation Act-2001. **10**

b) A VFD is to be installed for a fan. The initial investment is 3 lakh rupees, and the cashflow at the end of the 1st, 2nd and 3rd years are 1.2 lakh, 1.5 lakh and 1.5 lakh rupees respectively. Calculate NPV at 10 % discount rate and check whether this project is feasible or not? **05**

c) Define benchmarking. Illustrate the external benchmarking used in Energy Audit Process in brief. **05**

Q5) a) Define energy audit. What are the types of Energy Audit? Discuss the steps involved to conduct detailed Energy Audit. **10**

b) State the special desirable properties that energy audit instruments should have in comparison to conventional measuring instruments. **05**

c) Define Green building. Discuss the main features of green building. **05**

Q6) a) State the factors which affects the performance of boiler. **10**

b) A 2 MW captive power plant operating at a load factor of 90% consumes 0.8 kg of coal for every kWh of energy generated. The coal contains 40% of carbon with a GCV of 4200 kCal/kg. Now the boiler is being fired with the sawdust containing 30% carbon with a GCV of 3600 kCal/kg. Due to this modification to generate same kWh of energy 0.9 kg of sawdust is being used. Calculate the Annual CO2 emissions reduction that the plant would gain due to this, if the plant operates for 7000 hours/year? (One kg of carbon after complete combustion produces 3.67 kg of CO2) **10**

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QP code : 10087598

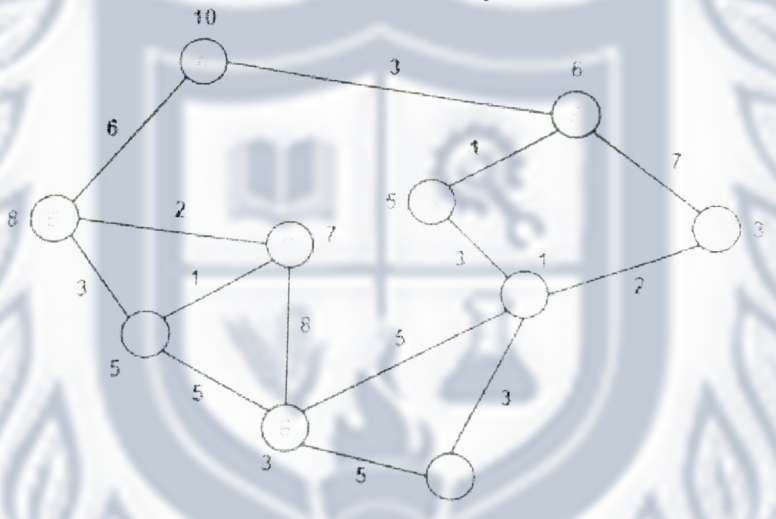
BE sem VII Electrical R-19 C scheme

Time: 3 hrs **Marks: 80**

Note: 1. Question number 1 is **compulsory.**
2. Solve any **three** questions out of the remaining **five** questions
3. Assume suitable data if necessary.
4. Figure to the right indicates full marks.

Q.1 Solve any **Four** of the following.

(a) Consider the graph shown in Fig. below. Assume that the initial state is A and the goal state is J. The numbers written on the edges represent the distance between the nodes. The numbers written on nodes represent the heuristic value. Find the most cost-effective path to reach from start state A to final state J using A* Algorithms. Is it an optimal solution? If not please write the optimal solution. **05**



(b) State the reason for increase in the popularity of data mining in the field of machine learning. **05**

(c) Calculate the mean square error (MSE) and root mean square error (RMSE) for the following electricity consumption price prediction **05**

Sr. No	Actual Price	Predicted Price
1	100	130
2	150	170
3	200	220
4	250	260
5	300	325

(d) Demonstrate that data cleansing is an important aspect for unsupervised learning. **05**

(e) Describe the challenges in static security assessment systems. 05

Q.2 (a) Describe McCulloch-Pitts Neuron Model and discuss its performance for the implementation of NOT, OR, and AND operations. 10

(b) Why is dimensionality reduction an important issue? Describe the steps to reduce dimensionality using the principal component analysis method by clearly stating mathematical formulas used. 10

Q.3 (a) State the problem with the perceptron training rule. How gradient descent and delta rule address the problem. Derive the gradient descent rule. 10

(b) Points (4,1), (4,-1) and (6,0) belong to class positive and points (1,0), (0,1), and (0,-1) belong to negative class. Draw an optimal hyperplane to classify the points. 10

Q.4 (a) Discuss the challenges faced by machine learning applications in solving various problems of power network management. 10

(b) Explain the decision tree? Comment on the selection of the best attribute for decision tree classifier along with examples. 10

Q.5 (a) The following data consists of the current available at probe 1 and probe 2 of a metering instrument. If the current at probe 1 13 A is predict the likely current at probe 2. 10

Current at Probe 1 (A)	Current at Probe 2 (A)
8	4
3	12
2	1
10	12
11	9
3	4
6	9
5	6
6	1
8	14

(b) Use agglomerative clustering and draw a single link dendrogram for the following distance matrix. **10**

	1	2	3	4	5
1	0				
2	2	0			
3	6	3	0		
4	10	9	7	0	
5	9	8	5	4	0

Q.6 Write short notes on any **Four**

(a) Compare informed and uninformed strategies **05**

(b) Data Mining **05**

(c) Activation function **05**

(d) Deep Learning **05**

(e) Electrical load pattern classification using machine learning **05**

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