[3 hrs] **[80 Marks]**

Note: 1. Question 1 is compulsory
2. Answer any three out of remaining question
3. Assume suitable data where required.

Q1

A. What is PEAS descriptor? Give PEAS descriptor for robot maid for cleaning the house. **[5]**

B. Discuss different applications of AI. **[5]**

C. Draw and explain architecture of Expert System. **[5]**

D. In a class, there are 80% of the students who like English and 30% of the students who likes English and Mathematics, and then what is the percentage of students those who like Math, also like English? Solve it using Conditional probability. **[5]**

Q2

A. Define chromosome, selection, fitness function, cross over and mutation as used in Genetic Algorithm. Explain how Genetic Algorithm in works. **[10]**

B. Draw and describe the architecture of Utility based agent. How is it different from Model based agent? **[10]**

Q3

A. Explain A* algorithm in detail. **[10]**

B. Define belief Network. Describe the steps of constructing belief network with an example. **[10]**

Q4

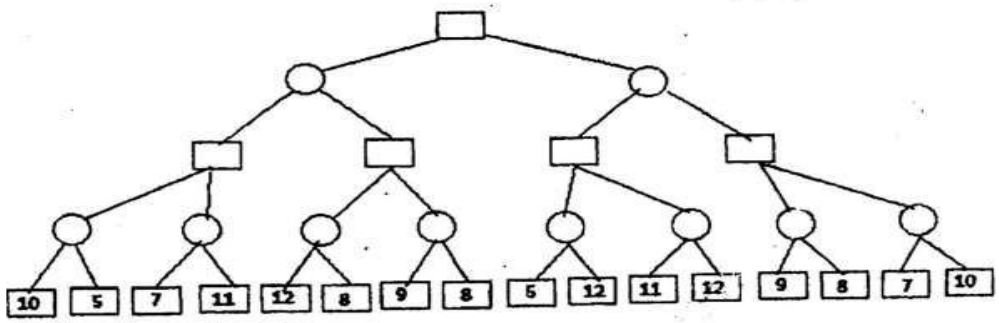
A. Illustrate forward chaining and backward chaining in propositional logic with example. **[10]**

B. Explain different types of learning in AI. **[10]**

Q5

A. Consider the following axioms **[10]**
All people who are graduating are happy.
All happy people smile.
Someone is graduating.
Prove that "Is someone Smiling?" using resolution technique. Draw resolution tree.

B. Explain Alpha-beta pruning algorithm. Apply alpha beta pruning on following example considering first node as MAX. **[10]**



Q.6

A. Explain hill climbing algorithm with example. Explain the problems faced by hill climbing algorithm. **[10]**

B. Explain total order planning and partial order planning in detail with example. **[10]**

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Time: 3 hours Max. Marks: 80

N.B. (1) Question one is Compulsory.
(2) Attempt any 3 questions out of the remaining.
(3) Assume suitable data if required.

Q. 1	a)	Compare and contrast Circuit switched network and Packet switched network	05
	b)	Describe the different guided transmission medias used in the network	05
	c)	What is Channel Allocation problem? explain in short pure and slotted ALOHA	05
	d)	Obtain the 4-bit CRC code for the data bit sequence 10011011100 using the polynomial $x^4 + x^2 + 1$	05
Q 2	a)	Describe in detail OSI reference model with a neat diagram	10
	b)	What is Channel allocation problem? Explain CSMA/CD protocol. A network with CSMA/CD has 10 Mbps bandwidth and 25.6ms maximum propagation delay. What is the minimum frame size?	10
Q 3	a)	Compare and contrast between i) IPv4 vs IPv6 ii) Connection oriented protocol vs Connectionless protocol	10
	b)	Explain in brief Cisco PPDIOO Network design Methodology	10
Q 4	a)	What is SDN? Explain SDN architecture along with Operations of control and data planes	10
	b)	What is Routing? What are desirable characteristics of routing algorithms? Explain distance vector routing with suitable example	10
Q 5	a)	Elaborate the architectures of NOX and POX controllers of SDN with their comparison	10
	b)	Elaborate Cisco SONA Architecture in detail	10
Q 6		Write a short note on	
	a)	Sliding Window Protocol	05
	b)	OpenFlow messages	05
	c)	NAT	05
	d)	DHCP	05

[Time: 3 Hours] **[Max. Marks: 80]**

Instructions:

1) Attempt any **Four questions**.
2) All questions carry equal marks.
3) Figures to the right indicate full marks.
4) Illustrate your answers with neat sketches wherever necessary.
5) Assume suitable additional data, if necessary and clearly state it.

Q.1	**(a)**	Discuss IOTWF Standardized Architecture.	**10**
	(b)	Define IoT. Explain the characteristics of IoT.	**05**
	(c)	Compare and contrast – COAP and MQTT protocol.	**05**
Q.2	**(a)**	Discuss the following IoT Protocols- i.) RFID ii.) WiFi iii.) LowPAN iv.) BLE v.) Zigbee	**10**
	(b)	Define - Smart objects in IoT. Discuss characteristics and trends of smart object.	**05**
	(c)	Differentiate between Edge Computing and Fog Computing.	**05**
Q.3	**(a)**	Discuss the different strategies to organize data for IoT analytics.	**10**
	(b)	Write any 5 points of comparison between – Arduino vs. Raspberry Pi	**05**
	(c)	Write short note on – Anlytics Vs. Control applications.	**05**
Q.4	**(a)**	Design IoT application for Home Automation considering smart lighting and home intrusion detection. Explain the proposed architecture and different components used for the same.	**10**
	(b)	Define IoTAnlytics. Discuss IoT analytics challenges. Also explain IoT analytics for cloud.	**05**
	(c)	What is the significance of data visualization in IoT and data analytics? How Dashboarding is it designed for data visualization?	**05**
Q.5	**(a)**	Sate and explain in brief the 3 layers in Core IoT Functional block with diagram.	**10**
	(b)	State and explain -Data Analytics vs. business benefits.	**05**
	(c)	Differentiate between IoT and IIoT.	**05**
Q.6	**(a)**	Propose an IoT application design for Smart Cities with respect to smart parking and smart health monitoring. Discuss the components used for its implementation.	**10**
	(b)	Explain various IoT data visualization tools and techniques.	**05**
	(c)	Write short note on – AMQP.	**05**

[Time: 3 Hours] **[Marks:80]**

N.B. 1. Question No. 1 is compulsory.
2. Attempt any three questions out of remaining five.
3. All questions carry equal marks
4. Assume Suitable data, if required and state it clearly.

Q.1 Attempt any four: **20**

a) Find the standard deviation of the average temperatures recorded over a five-day period last winter: 19, 21, 18, 24, 12?

b) X is a normally distributed variable with mean $\mu = 30$ and standard deviation $\sigma = 4$. Find:
i) $P(x < 40)$, ii) $P(30 < x < 35)$?

c) Discuss Boot strapping vs. re-sampling

d) The school principal wants to test if it is true what teachers say – that high school juniors use the computer an average 3.2 hours a day. What are our null and alternative hypotheses?

e) What do you mean by correlation and regression? Explain with example

Q.2 a) Find the value of the correlation coefficient from the data given in the following table: **10**

SUBJECT	AGE (X)	GLUCOSE LEVEL(Y)
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81

b) **10**

Explain briefly why ANOVA is used? Solve using One-way ANOVA

OBSERVATIONS	A	B	C
1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

method:

Q.3 a) Explain type I & type 2 error in detail. **10**
(ii) What is the use of scatter plot and box plot?

b) In a manufacturing unit, four teams of operators were randomly selected and sent to four different facilities for machining techniques training. After the training, the supervisor conducted the exam and recorded the test scores. At 95% confidence level does the scores are same in all four facilities? **10**
(Hint: Use Kruskal–Wallis test)

Facility 1	Facility 2	Facility 3	Facility 4
88	77	71	52
82	76	56	65
86	84	64	68
87	59	51	81

Q.4 a) If the sample mean and expected mean value of the marks obtained by 15 students in a class test is 290 and 300 respectively. What is the t-score if the standard deviation of the marks is 50? **10**

b) Find out what is the relation between the GPA of a class of students and the number of hours of study and the height of the student **10**

GPA	Height	Study Hours
2.9	66	7
3.16	57	7
3.62	64.5	6
2	62	7
3.45	69.5	8
2.8	65	9
3.63	63	6
2.81	68	5
3.33	59.5	4
2.75	64	10
3.86	69	7

Q.5 a) A farmer is trying out a planting technique that he hopes will increase the yield on his pea plants. The average number of pods on one of his pea plants is 145 pods with a standard deviation of 100 pods. This year, after trying his new planting technique, he takes a random sample of his plants and finds the average number of pods to be 147. He wonders whether this is a statistically significant increase. What are his hypotheses and the test statistic? Use a 0.05 significance level. **10**

b) Find the simple linear regression equation that fits the given data and coefficient of determination: **10**

Hour	Temp
2	21
4	27
6	29
8	86
10	86
12	92

Q.6 a) An agent sells life insurance policies to five equally aged, healthy people. According to recent data, the probability of a person living in these conditions for 30 years or more is 2/3. Calculate the probability that after 30 years if **10**

i. All five people are still living.
ii. At least three people are still living.
iii. Exactly two people are still living. (Hint: Binomial Distribution)

b) Write short notes on (any two) **10**

i. Confidence Interval
ii. Central Limit Theorem
iii. Standard Error

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(3 hours) Total Marks: 80

N.B. 1. Question **No. 1** is compulsory
2. Attempt any **three** questions from remaining five questions
3. Assume suitable data if **necessary** and justify the assumptions
4. Figures to the **right** indicate full marks

Q1	A	Explain the working of DNS with the suitable diagrams. Clearly explain all the steps involved in DNS resolution.	05
	B	Write a JavaScript code for displaying a digital clock on a web page.	05
	C	What is Express JS? Explain the advantages of using it.	05
	D	Explain the event handling in React. Write a React code to create a button "Greet the User" and display an alert box saying "Hello!" on clicking that button.	05
Q2	A	Compare ES 5 and ES 6. Write a code in JavaScript to validate the email address entered by the user (check the presence of "@" character. If this character is missing, the script should display an alert box reporting the error and ask the user to reenter it again).	10
	B	Explain the concept of Hooks in React. What are the rules for using the Hooks? Write a code making use of React Hooks that displays four buttons namely, "Red", "Blue", "Green", "Yellow". On clicking any of these buttons, the code displays the message that you have selected that particular color.	10
Q3	A	Explain the Document Object Model using a diagram. Write a code in JavaScript for **any one** of the following: 1) To change the background color of the web page automatically after every 5 seconds. 2) To display three radio buttons on the web page, namely, "Red", "Blue" and "Green". Selecting any button changes the background color as per the name of the button.	10
	B	Explain the class components in React. What are the advantages of using them? Demonstrate its use by creating a class for the cars of different models. The component should access the state to display the model of the car on the web page.	10
Q4	A	What is NodeJs? What are the advantages of using it? Demonstrate the working of NodeJs by creating a simple server to display a "Welcome" message.	10
	B	Explain the architecture of NodeJs with a neat diagram. Demonstrate its use by writing the code which creates a simple text file with the data provided by the user.	10

Q5	A	Demonstrate the routing of web pages using React Router.	05
	B	Write a JavaScript code to set a cookie on the user's computer.	05
	C	When are the React components re-rendered? Explain giving examples.	05
	D	What are the criteria for an API to be a RESTful API?	05
Q6	A	Explain the MVC architecture with a diagram. What are the advantages of using it?	10
	B	What is Express used for? Explain the advantages of using Express. What are the different parts of the Express server file?	10
