



COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)

Test 1 (T.Y.B.Tech) – Computer Making Sense of Data

Academic Year: 2022-23

Max.Marks:20

Duration: 1 Hour

Date: 18/09/2022

Instructions:

- Figures to the right indicate the full marks.
- Mobile phones and programmable calculators are strictly prohibited.
- Writing anything on question paper is not allowed.

Q1. Match The Following.

[2]

A. Business Analyst	1. A person with expertise in pulling datasets together and have knowledge of software and hardware issues
B. Data Mining Expert	2. A person with knowledge of subject matter including data-source accuracy of data. Etc.
	3. A person familiar with statistics, data analysis methods, data mining approaches.

Q2. Multiple Choice Questions. (1 mark each)

[6]

1 Examples of Ordinal can be:

- A) ID Numbers, eye color, zip codes
- B) Rankings, taste of potato chips, grades, height.
- C) Calendar dates, temperatures in Celsius or Fahrenheit, phone numbers
- D) Temperature in Kelvin, length, time, counts

2 Which of the following method is NOT used in Data Preparation.

- A) Categorize the data.
- B) Clean the data.
- C) Finding hidden relationships.
- D) Transform the data

3 This transformation moves the decimal to ensure the range is between 1 and -1.

- A) Decimal scaling.
- B) Normalization
- C) Z-Score
- D) All of the above

4. Data field is which represents characteristics or feature of data object

- A) Method
- B) Variable
- C) Task
- D) Attribute

5. Gender variable is example of

- A) Constant
- B) Discrete
- C) Continuous
- D) Dichotomous

6. Absolute Zero exists in

- A) Nominal Scale
- B) Interval Scale
- C) Ordinal Scale
- D) Ratio Scale

Q3. True and False (1 mark each)

[2]

A) Database containing ongoing business transactions is operational database

B) Segmenting data can speed up the analysis.

Q4. Answer the following. (2marks each)

[6]

A) What is Normalization? Explain with example.

B) Explain any TWO methods used in data analysis.

C) List down the steps considered in project planning.

Q5. Answer in one sentence. (1 mark each)

[2]

A) What is Prediction in Data Analytics?

B) What is Data warehouse?

Q6. Fill in the blanks. (1 mark each)

[2]

A) _____ statistics is used for quantifying relationship within the data.

B) _____ is a process of converting continuous data in to discrete values.

COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Test-1 Computer Networks

Program: T.Y.B.Tech. Computer Engineering

Year: 2022-23 Semester I Date: 20/09/2022 Duration: 1 hr. Max. Marks: 20

Instructions:

1. Attempt all questions.
2. Figures to right indicate full marks
3. Draw neat figures wherever required.
4. Assume suitable data, if necessary.

	Marks
Q.1	
A)	Consider the difference between circuit switching and packet switching. Assume the link's rate is 2 Mbps and users are generating data at a rate of 100 Kbps when busy. Users are busy only 1 % of the time. What is the maximum number of users that a circuit switching architecture can support simultaneously? 01
B)	Consider a packet switching architecture. From the following options, select the main components of delay when using packet switching. 01
	<ul style="list-style-type: none">I. Processing delay- II. Queuing.III. Transmission.IV. Propagation delay
C)	True or False? 01 Propagation delay is affected if the length of the packet is increased.
D)	True or False? 01 Consider an application that transmits data at a steady rate (for example the sender generates an N-bit unit of data every K time units, where K is small and fixed). Also, when such an application starts, it will continue running for a relatively long period of time. A circuit-switched network would be more appropriate for this application.
E)	Can packet loss occur in packet switching, despite using an output queue buffer? Justify your answer. 02
F)	What is the role of the router's forwarding table? 02
G)	Explain the difference between FDM and TDM. 02

- Q.2**
- A) Which of the following addresses is used to deliver a message to the correct application program running on a host? 01
- I. Port
 - II. IP
 - III. Logical
 - IV. Physical
- B) True or False? 01
- A socket address should be a combination of an IP address, a MAC address, and a port number.
- C) A user requests a web page that consists of some text and three images. For this page, the client will send one request message and receive response messages. 01
- D) True or False? 01
- Two distinct web pages (for example, www.coep.org.in/research.html and www.coep.org.in/students.html) can be sent over the same persistent connection.
- E) Consider an HTTP client that wants to retrieve a web document at a given URL. The IP address of the HTTP server is initially unknown. What transport and application-layer protocols besides HTTP are needed in this scenario? 02
- F) List the names of pull email protocols. 01
- G) Suppose a user wants to load a simple static HTML page into his/her browser. Also, assume RTT is 5 seconds and the total needed time for the page to be transferred is 4 seconds. Calculate the time it takes from the initial request to the server until the user receives the file completely. 01

H) The content of an HTTP request is as shown below.

02

GET /martignon/index.html HTTP/1.1
Host: cs.unibg.it
User Agent: Mozilla/5.0 (Macintosh; U; PPC Mac OS X; en)
AppleWebKit/124
(KHTML, like Gecko) Safari/125
Accept: ext/xml, application/xml, application/xhtml+xml,
text/html;q=0.9,
text/plain;q=0.8, image/png, *, *;q=0.5
Accept-Language: it
Keep-Alive: 300
Connection: keep-alive

Answer the following questions and indicate which field in the HTTP request you used to find the answer:

- I. What is the requested URL?
- II. Which version of HTTP is used?

20
20 Pak

College Of Engineering Pune
ILOE German T1

17-09-2022

Time: 30 Minutes

Total marks: 20

Student MIS NO

1	1	2	0	0	3	1	0	0
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Choose the correct

option.

1. Who is the chancellor of Germany?

- A] Frank Walter Steinmeier B] Angela Merkel
 C] Olaf Scholz

2. How many countries share a border with Germany?

- A] 9 B] 7 C] 6

3. What was the currency in Germany before Euro?

- A] Frank B] Dollar C] Deutschmark

4. How many nature reserves are there in Germany?

- A] 97 B] 99 C] 96

5. What is the largest airport in Germany?

- A] Munich B] Berlin C] Frankfurt

6. How many bridges are there in Berlin?

- A] 960 B] 690 C] 970

7. In which German region can you find the Neuschwanstein Castle?

- A] Bavaria B] Hamburg C] Saxony

8. Which author wrote Death in Venice?

- A] Max Frisch B] Franz Kafka C] Thomas Mann

9. In which year was Germany reunified?

- A] 1989 B] 1990 C] 1963

10. Which sport is Bastian Schweinsteiger known for?

- A] Tennis B] Football C] Hockey

11. How many times has Germany won the World Cup?

- A] 4 B] 3 C] 5

12. In which city is "The Lives of Others" set in?

- A] Bremen B] Stuttgart C] East Berlin

13. Which German band is known for the songs "Monsoon" and "1000 Meere"?

- A] Tokyo Hotel B] Scorpions C] Kraftwerk

14. Which composer's most famous work is The Flying Dutchman (1843)?

- A] Richard Wagner B] Robert Schumann C] Hans Zimmer

15. What is the capital of the state of Baden-Württemberg?

- A] Düsseldorf B] Stuttgart C] Munich

True or False

1. The river Danube flows through Germany. True

2. Germany faces the North Sea to the northwest. True

3. Germany was nicknamed "The country of poets and thinkers". True

4. You can find wild Eurasian lynx in Germany. True

5. The Weimar Republic was adopted in the 18th century. False



COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Government of Maharashtra.)

TEST - 1

Programme: B. Tech

Semester: V

Course Code: CT-21003

Course Name: Artificial Intelligence

Branch: Computer Engineering

Academic Year: 2022-2023

Duration: 1 Hr

Max Marks: 20

Student PRN No.

1 1 2 0 0 3 1 0 0

Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.

Marks	CO	PO
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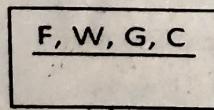
Q 1 a Give the complete state space representation of the farmer, wolf, goat and [05] 2 2,6

cabbage problem: A farmer with his wolf, goat, and cabbage come to the edge of a river they wish to cross. There is a boat at the river's edge, but, of course, only the farmer can row. The boat also can carry only two things (including the rower) at a time. If the wolf is ever left alone with the goat, the wolf will eat the goat; similarly, if the goat is left alone with the cabbage, the goat will eat the cabbage. Devise a sequence of crossings of the river so that all four characters arrive safely on the other side of the river.

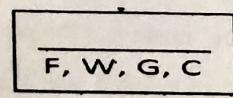
Let nodes represent states of the world; e.g., the farmer and the goat are on the west bank and the wolf and cabbage on the east. There will be a start state and a goal state.

Explain your answer accordingly.

Start State

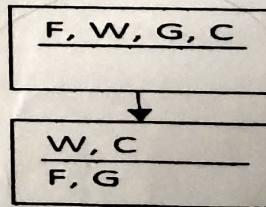


Goal State



Example:

WC
—
FG
↓
FGW

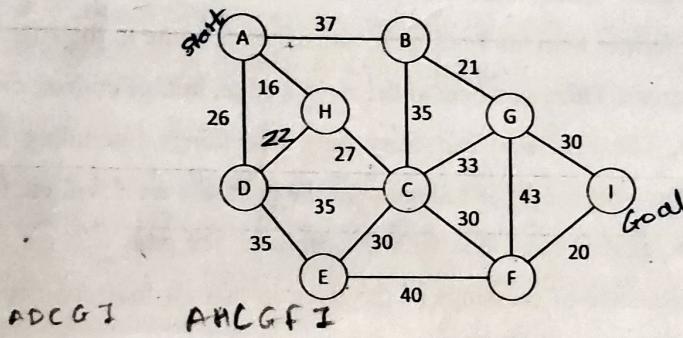




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- Q1 b** Give the PEAS description with explanation of:
- | | |
|--|---------------------------------|
| 1. Interactive English Tutor System.
2. Internet shopping agent
3. Tomato classification system
4. Satellite image analysis system
5. Hospital Management System | [05] 3.5 2.3.
4 &
6 |
|--|---------------------------------|

- Q2** Consider the following given state space graph of cities and their location are A:[25,72], B:[62,75], C:[55,40], D:[20,46], E:[38,15], F:[78,20], G:[80,63], H:[37,61], I:[92,35] on the X-Y plane. The weighted edge represents the distance between the two cities. Consider "A" as the start city and "I" as the Goal city. Trace the iteration by applying the following searching algorithm in a tabular format consisting: Open-List, selected Current Node, Closed-List, Goal-Test, Successor of Current Node, and current searching Path. Also, provide the resultant path cost.
- | |
|------------------------------------|
| 2 & 2.3.
6 4.6
& 7 |
|------------------------------------|



1. Apply DFS and BFS by considering nodes are explored in the clockwise direction starting from six O'clock. Node has a higher priority already present in fringe/open-list than newly added node to break the tie between equal path-cost nodes.
 2. Apply A-Star by using the Euclidian heuristic. Consider the integer value of calculated Euclidian heuristic. Provide the content of open-list/fringe with node evaluation function value when goal found and the sequence of explored nodes. Comment on whether the calculated Euclidian heuristic is admissible as well as consistent and why.
- | |
|------|
| [05] |
| [05] |



COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)

Class Test - I

Robotics

Course: FY (Robotics)

Branch: COMPUTER

Academic Year: 2021-2022

Max.Marks:20

Duration: 10 am to 11 am (60 Minutes)

Date: 17/09/2022

Student MIS
No.

1	1	2	0	0	3	1	0	0
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Each question for 5 marks

1. List and explain elements of Robotics System and list out the robot's applications area?
2. What is a work envelope? Explain with the sketch the work envelope for Cartesian configuration Robot & Jointed arm configuration.
3. A part weighing 20Kg is to be held in the four fingers gripper using friction against opposing fingers. The coefficient of friction is 0.3 between the mating surfaces. Assume g factor 3 for the force calculation. Compute the required gripper force.
4. Explain working principle of hydraulic actuator with the help of suitable diagram. Give its advantages & disadvantages.



COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Government of Maharashtra.)

Department of Mathematics

(MA 21001) Probability and Statistics for Engineers

Test 1

Course: T.Y.B.Tech , Semester V

Branches: Computer, Mechanical, E and TC, Instrumentation, Electrical

Academic Year: 2022-2023

Duration: 1 Hour

Max.Marks: 20

Date: 16/9/2022

Student MIS NO. : **112003100**

PLEASE READ THESE INSTRUCTIONS CAREFULLY.:

- (1) All questions are compulsory.
- (2) Figures to the right indicate maximum marks.
- (3) Mobile phones are strictly prohibited.
- (4) Use of scientific (non-programmable calculator) is allowed.
- (5) Writing anything on question paper is not allowed.
- (6) Write your MIS Number on Question Paper.

(1) Identify which of the following variables are qualitative and which are quantitative? Further specify which variables are discrete and which are continuous.

[CO1, 2 Marks]

- (a) Price for a canteen meal (b) Number of goals in a hockey match
- (c) Subject line of an email (d) Delivery time for a parcel

(2) Let X be a continuous random variable and a be a constant. Prove that $E(aX) = aE(X)$, where $E(X)$ represents expectation of a continuous random variable X .

[CO4, 1 Mark]

(3) Let E and F be two events with $P(E \cup F) = 0.6$, $P(E) = 0.5$, $P(F) = 0.3$. Find $(E \cap \bar{F})$ where \bar{F} : Complement of F .

[CO3, 1.5 Mark]

(4) In a class, 35 percent of the students study science and history. 65 percent of the students study science . What is the probability of a student studying history given he/she is already studying science?

[CO3, 1 Mark]

1/1

[P.T.O.]

(5) A random variable X has the following probability mass function (PMF)

X	0	1	2	3	4	5	6
$P(X=x)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

- (i) Find k . (ii) Find $P(X > 2)$. (iii) Find Variance of X .

[CO2, 2Marks]

(6) A hiking enthusiast has a new app for his smartphone which summarizes his hikes by using a GPS device. The distance hiked (in KM) and maximum altitude (in m) for last 10 hikes are given below:

Distance	12.5	29.9	14.8	18.7	7.6	16.2	16.5	27.4	12.1	17.5
Altitude	342	1245	502	555	398	670	796	912	238	466

Calculate the 50 percent quantiles for both distance and altitude.

(7) Consider the following cumulative distribution function of a random variable X :

$$F(x) = \begin{cases} 0 & \text{if } x < 2; \\ \frac{-x^2}{4} + 2x - 3 & \text{if } 2 \leq x \leq 4; \\ 1 & \text{if } x > 4. \end{cases}$$

1. Find the probability density function (PDF) of X .
2. Determine expectation of X .
3. Find $P(X=3)$.

3/4

[CO2, 3 Marks]

(8) If a fair coin is tossed twice. Let the random variable X be defined as 'number of heads'. Find probability mass function (PMF) and cumulative distribution function (CDF) of random variable X . Also plot the graphs of PMF and CDF. [CO3, 3Marks]

(9) Suppose we have the following information to construct the histogram for a continuous variable with 2000 observations: [CO5, 2 Marks]

j	e_{j-1}	e_j	h_j
1	0	1	0.125
2	1	4	0.125
3	4	7	0.125
4	7	8	0.125

Determine relative frequency for each interval and the absolute frequency. Here j -th class interval is $[e_{j-1}, e_j]$ and h_j : height of j -th bar of histogram.

(10) In a particular clinic, 10 percent of patients are prescribed narcotic pain killers. Overall, five percent of the clinic's patients are addicted to narcotics (including pain killers and illegal substances). Out of all the people prescribed pain pills, 8 percent are addicts. If a patient is an addict, what is the probability that they will be prescribed pain pills? [CO5, 2.5 Marks.]

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198
v 198
4

7/7a



COLLEGE OF ENGINEERING, PUNE
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TEST - 2

Programme: B. Tech

Semester: V

Course Code: CT-21003

Course Name: Artificial Intelligence

Branch: Computer Engineering

Academic Year: 2022-2023

Duration: 1 Hr

Max Marks: 20

Student PRN No.

112003100

Instructions:

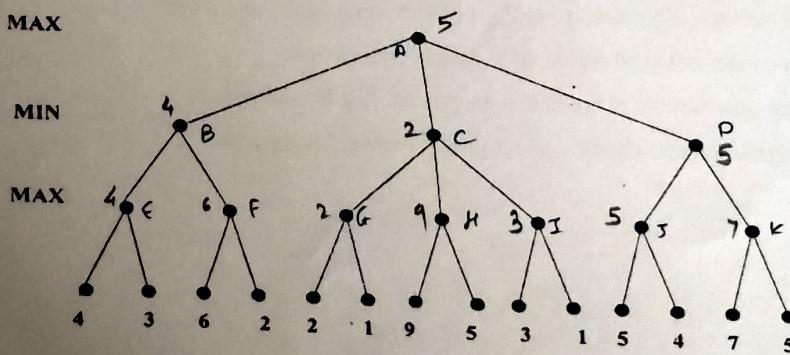
1. Figures to the right indicate the full marks.
 2. Mobile phones and programmable calculators are strictly prohibited.
 3. Writing anything on question paper is not allowed.
 4. Exchange/Sharing of stationery, calculator etc. not allowed.
 5. Write your PRN Number on Question Paper.

Q 1 a Consider the following map for graph colouring problem with red, green, and blue colours. [05] 2 26

1. Formulate the CSP with constraint of adjacent countries don't have same colour.
 2. Draw the constraint graph.
 3. Let assign the red to Russia then determine the resulting domain of the variables using ARC-consistency.
 4. Consider the resulting domain values after ARC-consistency and find number of valid solutions possible for CSP.



Q 2 b In the game tree below, the value below each node is the static evaluation at that node. MAX next to a horizontal line of nodes means that the maximizer is choosing on that turn, and MIN means that the minimizer is choosing on that turn. Using minimax without Alpha-Beta pruning, which value will be obtained at root node? Draw the game tree at every step and explain in detail. [05] 3,5 2,3,
4 & 6





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Q 3 This exercise uses the function MapColor and predicates $In(x, y)$, $Borders(x, y)$, and $Country(x)$, whose arguments are geographical regions, along with constant symbols for various regions. In each of the following we give an English sentence and a number of candidate logical expressions. For each of the logical expressions, state whether it (1) correctly expresses the English sentence; (2) is syntactically invalid and give the reason of invalid; or (3) is syntactically valid but does not express the meaning, given the reason of invalid meaning. [05] 2 & 2,3,
6 4,6
& 7

a. Paris and Marseilles are both in France.

- (i) $In(Paris \wedge Marseilles, France)$.
- (ii) $In(Paris, France) \wedge In(Marseilles, France)$.

b. There is a country that borders both Iraq and Pakistan.

- (ii) $\exists c Country(c) \Rightarrow [Border(c, Iraq) \wedge Border(c, Pakistan)]$.
- (iii) $[\exists c Country(c)] \Rightarrow [Border(c, Iraq) \wedge Border(c, Pakistan)]$.

c. All countries that border Ecuador are in South America.

- (i) $\forall c Country(c) \wedge Border(c, Ecuador) \Rightarrow In(c, SouthAmerica)$.
- (iv) $\forall c Country(c) \wedge Border(c, Ecuador) \wedge In(c, SouthAmerica)$.

d. No region in South America borders any region in Europe.

- (i) $\neg[\exists c, d In(c, SouthAmerica) \wedge In(d, Europe) \wedge Borders(c, d)]$.
- (iii) $\neg\forall c In(c, SouthAmerica) \Rightarrow \exists d In(d, Europe) \wedge \neg Borders(c, d)$.

e. No two adjacent countries have the same map color.

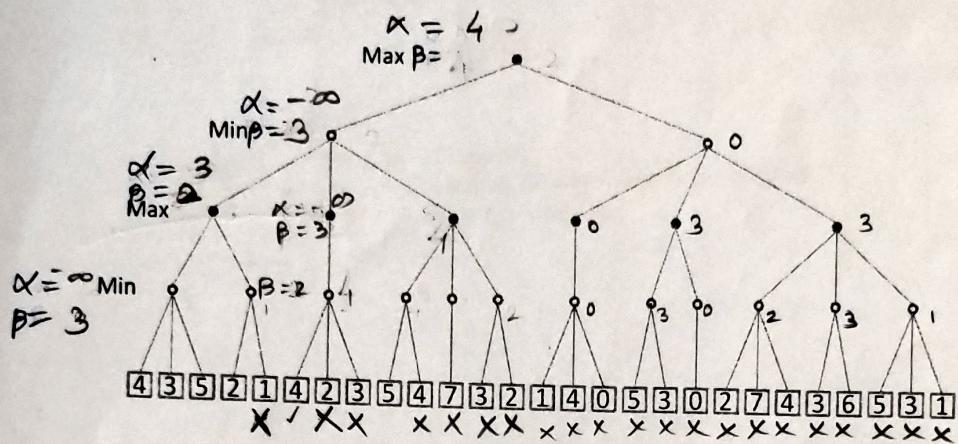
- (i) $\forall x, y \neg Country(x) \vee \neg Country(y) \vee \neg Borders(x, y) \vee \neg(MapColor(x) = MapColor(y))$.
- (ii) $\forall x, y (Country(x) \wedge Country(y) \wedge Borders(x, y) \wedge \neg(x = y)) \Rightarrow \neg(MapColor(x) = MapColor(y))$.

Q 4 Perform the minimax algorithm using alpha-beta pruning on the figure below. [05] 1,2, 1,2,
3 & 3,4,

- 1. What is the value obtained at root node. Justify your answer.
- 2. What is the total number of nodes that are pruned. Justify your answer.
- 3. Show computation of alpha-beta parameters at each and every node.



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COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Government of Maharashtra.)

Test 2 (T.Y.B.Tech) – Computer Engineering
---Making Sense of Data---
(Honours in Data Science(CT(HO)-21001))

Max. Marks: 20

Date: 16/10/2022

Academic Year: 2022-23

Duration: 1 Hour

Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.

Q1. Match The Following.

[2]

- | | |
|--|-------------------|
| 1 A standardized measure of the deviation from the mean. | A. Mode |
| 2 The value at the mid-point. | B. Median |
| | C. Std. Deviation |
| | D. Mean |
| | E. Variance |

Q2. Multiple Choice Questions.

[6]

1. If Mean and Mode of some data are 4 and 10 respectively, its median will be

- A) 1.5 B) 5.3 C) 16 D) 6

2. A _____ represents the frequencies of values of a variable bucketed into ranges.

- A) Histogram B) Gantt Chart C) Box Plot D) All of above

3. Find the median of the given set of numbers 2, 6, 6, 8, 4, 2, 7, 9,

- A) 6 B) 8 C) 4 D) 5

4. Amongst which of the following shows in Box plot?

- A) First quartile B) Median C) Outliers D) All of the above

5. While constructing Frequency Distribution, the number of classes used depends upon
- A) Number of Observation
 - B) Size of Class
 - C) Range of Data
 - D) None of These

6. The graph of the normal distribution depends on
- A) Mean and Standard Deviation
 - B) Harmonic Mean and Standard Deviation
 - C) Harmonic Mean
 - D) Standard Deviation Only

[2]

Q3. True and False

- A) In Histogram the length of the bar is proportional to the size of the group.
- B) Variables with a pronounced peak toward the mean have a low kurtosis score.

[6]

Q4. Answer the following.

- A) How to find outliers? Explain with example.
- B) Explain any TWO graphs used in data visualization.
- C) What is p-value? How it is used to determine the null hypothesis?

[2]

Q5. Answer in one sentence.

- A) What is Negative Relationship between two variables?
- B) Explain Type II Error.

[2]

Q6. Fill in the blanks.

- A) _____ plot is used to identify the outliers in the data.
- B) If correlation coefficient is _____ then there appears to be little to no relation between the variables.

14.5
20 Pab

COLLEGE OF ENGINEERING PUNE

ILOE GERMAN T2

DATE: 15/10/22

DURATION: 40 MIN.

MIS: 112003100

MARKS: 20

Frage 1 Bitte schreiben Sie die Antworten in Wörtern. CO 3

Please write the answers in words.

3 marks

289 zweibundertneunundachtzig

320 dreibundert zweizig X

108 einhundertacht

2.5 $39 + 21 = 60$ Sechzig ✓

$45 / 5 =$ neun ✓

$6 \times 2 =$ zwölf ✓

Frage 2 Ergänzen Sie. CO 1, 2, 4, 5

Complete the following. 12 marks

1. Maria kommt aus Russland. Sie ist Russikerin. (Nationalität)
2. Pavel untersucht Patienten im Krankenhaus. Er ist Krankenarzt von Beruf. (Beruf)
3. In China spricht man Chinesisch. (Sprache) pfeift
4. Heute ist Freitag. Vorgestern war Mittwoch. (Wochentage)
5. Februar, März, April, Mai, Juni, Juli. (Monate)
6. Herr Beier kommt aus Deutschland aber er wohnt jetzt in England.
(Bey)
7. Claudia ist Studentin. Sie studiert Medizin.
8. Felix, wann hast du Geburtstag?
9. Ich bin Deutschlehrerin. (sein)
10. Morgen kochen wir nicht zu Hause. (kochen)
11. Paul arbeitet bei Mercedes. (arbeiten)
12. Wie heißt „window“ auf Deutsch? Schreiben Sie auch den richtigen Artikel.

die ventiletor X

Frage 3	Schreiben Sie den Artikel für Singular und schreiben Sie auch die Pluralformen.	CO 5
	Write the articles for singular and write plural forms.	5 marks
<u>der</u> Bleistift	<u>die</u> Bleistifte	
<u>der</u> Schwamm	<u>die</u> Schwämme	
<u>die</u> Tasche	<u>die</u> Taschen	
<u>das</u> Papier	<u>die</u> Papieren	+
<u>der</u> Overheadprojektor	<u>die</u> Overheadprojektoren	

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COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Government of Maharashtra.)

Department of Mathematics

(MA 21001) Probability and Statistics for Engineers

Test 2

Course: T.Y.B.Tech , Semester V

Branches: Computer, Mechanical, E and TC, Instrumentation, Electrical

Academic Year: 2022-2023

Duration: 1 Hour

Max.Marks: 20

Date: 14/10/2022

Student MIS NO. :

PLEASE READ THESE INSTRUCTIONS CAREFULLY.:

- (1) All questions are compulsory.
- (2) Figures to the right indicate maximum marks.
- (3) Mobile phones are strictly prohibited.
- (4) Whenever necessary, use statistical tables provided by invigilator to do the statistical calculations.
- (5) Use of scientific (non-programmable calculator) is allowed.
- (6) Writing anything on question paper is not allowed.
- (7) Write your MIS Number on Question Paper.

- (1) (a) Let X be a random variable which follows a Bernoulli probability distribution. What is the expected value and variance of X . [CO1, 1 Mark]
- (b) A company organizes a raffle at an end-of-year function. There are 500 lottery tickets in total and 50 of them are marked as winning tickets. The event A of interest is "ticket wins" (coded as $X = 1$) and if the complementary event \bar{A} occurs, then it is coded as $X = 0$. Find expected value of X and variance of X . [CO2, 1 Mark]

- (2) Let T be a random variable which follows t-distribution. Using statistical tables, find k , if $P(k < T < 2.807) = 0.095$ for a random sample of size 24. [CO2, 2 Marks]

- (3) State whether the following statements are true or false and justify your answer.
 - (a) Every statistic is a random variable. [CO1, 1 Mark]
 - (b) Let X_1, X_2, \dots, X_n be identically and independently distributed random variables whose population mean is μ and population variance is σ^2 . Then $\frac{1}{n} \sum_{i=1}^n (X_i + 1)$ is an unbiased estimator of μ . [CO3, 1 Mark]
 - (c) χ^2 - distribution (chi-squared distribution) is a symmetric distribution and can realize positive as well as negative values including zero. [CO1, 1 Mark]

(4) The average number of field mice in a 5 acre wheat field is estimated to be 10. Find the probability that fewer than 7 field mice are found on 2 of the next 3 acres inspected. Also write step wise code to evaluate this answer using R software.

[CO3, 3 Marks]

(5) Most graduate schools of business require applicants for admission to take the Graduate Management Admission Council's GMAT examination. Scores on the GMAT are roughly normally distributed with a mean of 627 and a standard deviation of 112. What is the probability of an individual scoring above 600 on the GMAT? How high must an individual score on the GMAT in order to score in the highest 5 percent? Justify and express both your answers using normal curve.

[CO3, 3 Marks]

(6) Number of calls received per hour by a telephone answering service is a Poisson random variable X with $\lambda = 6$. Time in hours between two successive calls is exponentially distributed. Find the probability that time between two successive calls exceeds 15 minutes.

[CO3, 3 Marks]

(7) It is known that screws produced by a certain company will be defective with the probability 0.01, independently of each other. The company sells the screws in package of 10 and offers a money-back guarantee that at most 1 of the 10 screws is defective. What proportion of packages sold must the company replace? Write the command to calculate this proportion using R software.

[CO4, 3 Marks]

(8) What is the output of the following code in R-studio? Justify your answer graphically.

[CO4, 1 Mark]

```
magic<-function(x){0*(x<0)+(x^3)*(x>=0&x<=1)+1*(x>1)}  
curve(magic,from=-2,to=2)
```

o o s²



COLLEGE OF ENGINEERING, PUNE

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Class Test - II

Robotics

Course: Fourth Y (Robotics)

Branch: COMPUTER

Academic Year: 2021-2022

Max. Marks: 20

Duration: 10 am to 11 am (60 Minutes)

Date: 17/09/2022

Student MIS | 1 | 1 | 2 | 0 | 0 | 3 | 1 | 0 | 0
No.

1. Explain a difference between a CCD and CMOS camera technology? (6)

2. Explain principle of working of D. C. motors electric motor with the help of suitable diagram. Give its advantages & disadvantages (7)

3. Frame B is rotated by 60° about Z of A. Then it is rotated by 30° about X of B. Bp (1,1,1), Find Ap=?
*-0.36
0.61
0.51* (7)

COLLEGE OF ENGINEERING, PUNE
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Test-2 Computer Networks

Program: T.Y.B.Tech. Computer Engineering

Year: 2022-23 Semester I Date: 17/10/2022 Duration: 1 hr. Max. Marks: 20

Instructions:

1. Attempt all questions.
2. Figures to right indicate full marks
3. Draw neat figures wherever required.
4. Assume suitable data, if necessary.

Marks

01

Q.1 A) True or False:
UDP handles congestion but not flow control.

01

B) Multiplexing is done at the _____ side.

02

C) The following is a dump of a UDP header in hexadecimal format.
06 32 00 0D 00 1C E2 17

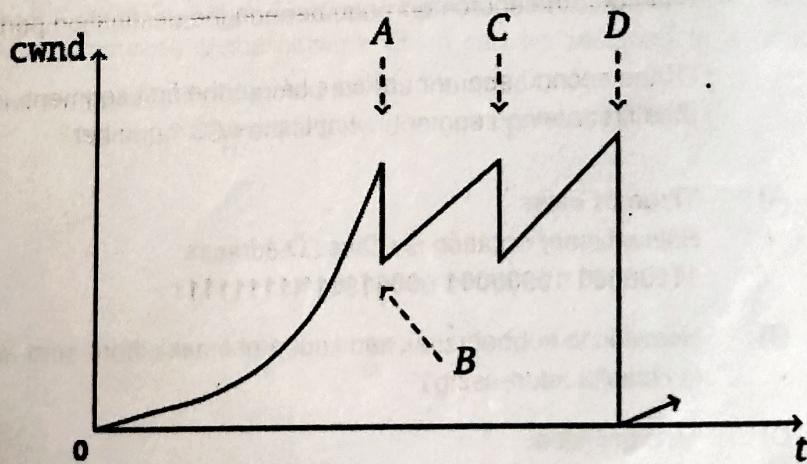
What is the

- i. Length of the data?
- ii. Destination port number?

D) Describe the congestion control mechanism shown in the below figure.

02

1. For the step from $t=0$ to event A
2. Between event A and event C



E) In the stop-and-wait protocol, the maximum send window size is _____ and the maximum receive window size is _____, where m is the number of bits in the sequence. 01

- - a) 1; 1
 - b) 2m; 1
 - c) 1; 2m
 - d) 2m; 2m

F) Hosts A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 40 bytes of data respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A.

i. In the second segment sent from Host A to B, what are the sequence number, source port number and destination port number?

i. If the first segment arrives before the second segment, in the acknowledgment of the first arriving segments, what is the ACK number, the source port number and the destination port number?

i. If the second segment arrives before the first segment, in the ACK of the first arriving segment, what is the ACK number?

Q.2 A) True or False 01

Below binary notation is Class D address

11000001 10000011 00011011 11111111

B) How do the subnet mask and supernet mask differ from a default mask in classful addressing? 01

C) True or False 01

The first address in the block can be found by setting the rightmost 32 - n bits to 0s.

D) An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be _____. 01

E) Your company grows very fast. It soon has 550 computers that need Internet access at the same time. You ask 2 ISPs to buy IP addresses. ISP XYZ allocates IPs in Class A, B or C. ISP WST allocates IPs using CIDR. Limited by the budget, you always want the smallest IP range that can support all computers. 04

- I. If you buy one class of IPs from ISP XYZ, which class will you buy? How many addresses do you get?
- II. If you buy from WST, how many bits in the address are network prefix? How many addresses do you get?
- III. Another choice is buying several class C IPs from XYZ. How many C classes do you need? How many addresses do you get?
- IV. Not all addresses can be used for end hosts. How many hosts can a Class C subnet accommodate?

F) The subnet mask for a particular network is 255.255.31.0 Which of the following pairs of IP addresses could belong to this network? 01

- a) 172.57.88.62 and 172.56.87.23
- b) 10.35.28.2 and 10.35.29.4
- c) 191.203.31.87 and 191.234.31.88
- d) 128.8.129.43 and 128.8.161.55

G) In the network 200.20.11.144/27, the fourth octet (in decimal) of the last IP address of the network which can be assigned to a host is 01
_____.



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END Semester Examination

Programme: B.Tech

Semester: VI

Course Code: AS (HS)-21002

Course Name: German language

Branch: Instrumentation and Control Engineering,

Computer, E&TC, Electrical

Academic Year: 2022-23

Duration: 2.5 Hours

Max Marks: 60

1 1 2 0 0 3 1 0 0

50+

Student PRN No.

Instructions:

- Figures to the right indicate the full marks.
- Mobile phones and dictionaries are strictly prohibited.
- Writing anything on question paper is not allowed.
- Exchange/Sharing of stationery, calculator etc. not allowed.
- Write your PRN Number on Question Paper.

			Marks	CO	PO
Q 1	a	Lesen Sie bitte den Text und beantworten Sie die Fragen.(Nur 5) Read the text and answer the following questions.(Only 5) Peter Winsley ist Ingenieur und kommt aus England. Er ist seit 2 Jahren verheiratet und wohnt mit seiner Frau Kate in Berlin. Kate ist Journalistin. Sie spricht Deutsch und Französisch. Peter macht am Wochenende einen Intensivsprachkurs und spricht auch schon gut Deutsch. Peter und Kate möchten Kinder haben. Aber im Moment ist für beide der Beruf sehr wichtig. Die Winsleys finden Berlin interessant. Sie gehen in die Museen und in Konzerte und Opern. Sie lieben klassische Musik. 1] Was sind Peter und Kate von Beruf? 2] Wie ist Peters Muttersprache? 3] Sind Peter und Kate verheiratet? 4] Was macht Peter am Wochenende? 5] Haben Peter und Kate Kinder? 6] Wo wohnen sie?	5	b, d	
		✓ Schreiben Sie die richtigen Personalpronomen! Write the correct personal pronoun. 1] Geht _____ einkaufen? 2] Heute mache _____ Yoga. 3] Das ist mein Handy. _____ ist neu. 4] Das sind Maria, Anna und Johanna. _____ lernen Japanisch.	6	e	



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✓ 5) Das ist meine Freundin. Sie ist Ärztin von Beruf.

✓ 6) Das ist ihr Baby. Es ist nur vier Monate alt.

✓ Ergänzen Sie die Sätze mit richtigen Verbformen.(Nur 6)

Write the correct verb form.(Only 6)

(sein, sprechen, möchten, arbeiten, lesen, finden, wohnen)

✓ 1) Janina studierte an einer Sprachschule.

✓ 2) Ich spreche sehr gut Englisch.

✓ 3) Wie ist die Handynummer von Anna?

✓ 4) Ich finde meine Tasche nicht. Wo ist das?

✓ 5) Sabrina spricht sehr gut Italienisch.

✓ 6) Mein Bruder wohnt in Delhi.

✓ 7) Pavel liest gern Bücher.

6 e

Q 2 ✓ Wie spät ist es? Schreiben Sie offiziell und informell.(Nur 5)

5 c, f

What is the time? Write official and informal. (Only 5)

1] 13.50

2] 04.25

3] 12.58

4] 21.15

5] 07.40

6] 14.05

b Verbinden Sie. (Nur ein)

5 g, a

Match the following (Only one)

1.

1. Guten Tag! Was möchten Sie trinken?	A. Zusammen, bitte.
2. Also, hier bitte.	B. 6,50 bitte.
3. Zusammen oder getrennt?	C. Guten Tag! Wir nehmen ein Glas Wein und einen Eistee bitte.
4. Das macht 6,20 Euro.	D. Wiedersehen.
5. Danke, auf Wiedersehen	E. Wir möchten bitte zahlen.

2.

1. Praxis Dr. Steinig. Guten Tag!	A. Ja, das geht auch. Danke.
2. Morgen? Nein, leider, morgen ist nichts frei. Aber am Donnerstag hätte ich noch einen Termin. Geht das?	B. Ja, hallo, Nowald hier. Ich habe um 10 Uhr einen Termin bei Ihnen. Aber ich habe leider keine Zeit. Haben Sie noch einen anderen Termin für mich frei? Morgen vielleicht?



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3. Um 16 Uhr?	A	C. Wiederhören
4. Wie ist noch mal Ihr Name?	D	D. Nowald, Felix Nowald
5. Gut, Herr Nowald, dann bis Donnerstag. Auf Wiederhören.	C	E. Am Donnerstag, Um wie viel Uhr?

Schreiben Sie die bestimmten Artikel und Plural! (Nur 5)

5 e

Write definite articles for singular and plural forms. (Any 5)

Nr.	Wort	Bestimmte Artikel (singular)	Plural
1	Kreide	✓	✓
2	Computer	✓	✗
3	Tasche	✓	✗
4	Stuhl	✓	✓
5	Heft	✓	✓
6	Lampe	✓	✓

Q 3 a Was passt nicht?

5 b

Odd one out.

1. die Kellnerin – die Freundin – die Lehrerin – die Pilotin
2. der Sonntag – der Dienstag – der Montag – das Wochenende
3. der Frühling – der Sommer – der März – der Herbst
4. der Salat – die Kartoffel – die Zwiebel – die Banane
5. das Hähnchen – das Brötchen – die Salami – der Schinken

b Ergänzen Sie das Formular!(Nur 6)

6 a, d

Fill up the form.(Only 6)

Ihr Freund, Martin Alvarez aus Spanien spricht kein Deutsch. Er möchte einen Deutschkurs besuchen. (Deutschkurs, Stufe 1)

Im Kursprogramm finden Sie folgenden Kurs.

Deutsch Stufe 1

Kursnummer 5077-59

Samstag - Vormittag

€ 160,-

Helfen Sie ihm und füllen Sie das Formular für ihn aus.

Ihr Freund, Martin Alvarez wohnt jetzt in Berlin, Alexanderplatz 29. Die Postleitzahl ist 50667. Ihre Handynummer ist +493020620357. Er ist am sechsten April 1985 geboren und ist single. Im Moment arbeitet er als Kellner in einem Restaurant.

1. Familienname –
2. Vorname –
3. Geschlecht –
4. Familienstand –



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5. Nationalität -
6. Geburtsdatum -
7. Beruf -

c

Bilden Sie Sätze.

- 6
1. was / du / von Beruf / sein / ?
 2. wann / du / frei / haben / ?
 3. wie viel / der Apfelsaft / kosten?
 4. er / mit Freunden / Fußball / spielen.
 5. am Nachmittag / er / Carina / treffen.

5

g, e

Q.4 a

Schreiben Sie bitte den richtigen Artikel. Bestimmt, unbestimmt oder negation.

6

e

Write the correct article. Definite, indefinite or negation.

1. Ist das _____ Taxifahrer?

- Nein, das ist _____ Taxifahrer. Das ist ein Boxer. _____ Boxer heißt Faustino.

2. Ist das _____ Heft?

- Nein, das ist _____ Heft. Das ist _____ Buch von Annalisa.

b
Ergänzen Sie

6

g

Complete the following.

(Flasche, Liter, Kilo, Gramm, Packung, Stück)

1. Ich möchte noch 200 _____ Wurst.
2. Wir brauchen zwei _____ Kartoffeln.
3. Kauf noch einen _____ Milch, bitte.
4. Katrin isst 3 _____ Kuchen.
5. Kaufst du bitte eine _____ Reis?
6. Eine _____ Olivenöl kostet 7,90 Euro.



END Semester Examination

Programme: B.Tech

Course Code: CT(HO)-21003

Branch: Computer Engineering

Duration: 3 hrs

Student PRN No.

Semester: VI

Course Name: Big Data Analytics

Academic Year: 2022-23

Max Marks: 60

1	1	2	0	0	3	1	0	0
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Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.

		Marks	CO	PO
Q 1	a Define Big Data. Explain any four characteristics of big data.	5	1	a,b
	b How is big data analysis helpful in increasing business revenue?	5	1	a,b
Q 2	a Scene 1: Suppose you just placed an order on an e-commerce platform. You get a "success" message but when you visit "all orders" page, and you don't see the order the one you just placed. Scene 2: Right when you're on the phone calling the support center, you reload the page, and the order suddenly appears. (a) Identify and justify the possible reason behind this whole scenario. (b) What type of consistency is used here? (c) With which consistency this issue can be resolved? (d) Suggest possible solutions (any 1) for solution in question (c).	5	1	c,d
	b What is CAP theorem? Explain its significance in distributed system.	5	1	a,b, c,e
Q 3	a What is Hadoop? Draw and explain Apache Hadoop Architecture.	5	2,3	b,c
	b Discuss any one technique used to optimize MapReduce jobs .	3	2,3	b,c
	c Explain the following terms with respect to information access: a. Streaming b. Low latency	2	2,3	a,c
Q 4	a What is the data structure used in Spark? Explain the following operations. ✓.distinct() 2.reduceByKey() 3.collect() 4.count()	5	3	d,e, f
	b What are the important components of the Spark ecosystem?	3	3	b,c, f



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c Explain following MLlib tools available in Spark

2 3 b,c,
f

1.Persistence 2.Utilities

Q 5 a Consider following dataset given in file dataset.txt:

Kumar,19,44,1st_year,12
Manoj,23,,2nd_year,-1
Raj,21,,0

5 4 d,f,
g,h

Refer the following Pig Latin script and answer the queries mentioned below:

A = load 'dataset.txt' using PigStorage(',');

B = filter A by \$1>20;

C = group B by \$2;

dump C;

a. How many records will be generated as an output after running this script?

b. You are tasked with writing a Pig Latin script that outputs unique names (first column) occurring in this file. Which Pig Latin operators will you use (choose the minimum number)?

b I. Explain two diagnostic operators in Pig.

5 4 d,f,
g,h

II. The file 'complex.txt' contains the following two lines (tab delimited):

TUDELFT EWI [adres#Mekelweg,number#4,buildingColor#redblue]

{(computer science), (mathematics), (electronics)}

TUDELFT 3ME [number#2,adres#Mekelweg,postcode#2628CD]

{(mechanical engineering), (maritime engineering), (materials engineering)}

What is the output of the following Pig script?

complex = load 'complex.txt' as (uni:chararray, faculty:chararray, location:map[], departments:bag{dlist:(d:chararray)});

A = foreach complex generate uni, flatten(location#'street');

dump A;

Q6 a IceCream Palace is a famous Ice cream outlet chain in India. Assume that the following details are recorded for deliveries of orders placed online:

7 5 d,f,
g,h

- ✓ Order ID - alpha-numeric code of length 6, unique across outlets, not null.
- ✓ Customer ID - null for non-registered users and unique alphanumeric code of length 7 for registered users across outlets
- ✓ Details - contains the ice cream codes (alpha-numeric of length 5) and corresponding numbers ordered
- ✓ Customer Name - string of length 20, not null
- ✓ Delivery Address - that consists of:
- ✓ House No - holds the number of the house/building
- ✓ Street - name of street/locality - of length 50
- ✓ City - name of the city - of length 25
- ✓ State - name of the state - of length 20
- ✓ Postal Code - alphanumeric of length 8

(a) Write an appropriate query to create an external table named OrderDelivery.

(b) Given that data is available at location "/test/iceCreamOrders" in multiple files. Write a query to point the "OrderDelivery" table to the correct data files.

b A start-up company wants to use Hive for storing its data. List the collection types provided by Hive for this purpose.

3 5 a,f



END Semester Examination

Programme: B.Tech

Semester: V

Course Code: CT-17001

Course Name: Artificial Intelligence

Branch: Computer Engineering

Academic Year: 2022-2023

Duration: 3 Hrs

Max Marks: 60

Student MIS No.

1	1	2	0	0	3	1	0	0
---	---	---	---	---	---	---	---	---

Instructions:

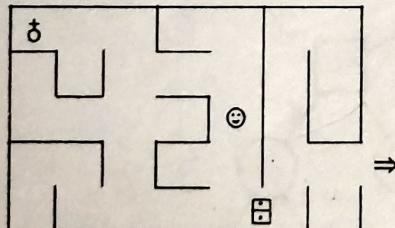
1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your MIS Number on Question Paper.

Marks	CO	PO
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Q 1 a You are trapped in a maze and needs to escape from it. Unfortunately, there is a [06] 2 2.6

locked door between you and the exit (\Rightarrow), and you have to take the key (δ) before you can unlock the door. You are not facing any special direction and can move one step in any direction at any time step, as long as there is no wall in the way. Alternatively, you can pick up the key (if you are in the right location), or you can unlock the door (if you have the key and are in the right location). Neither the key nor the door can move around on their own. Your goal is to find a plan for escaping the maze using as few moves as possible. Assume that the grid has size $M \times N$.

1. Give a suitable representation of the states in this searching problem. Justify your answer.
2. What is the size of the state space? Justify your answer.



Q 1 b Consider the Following CSP Problem:

[06] 3.5 2.3,

4 &

6

Variables = {A, B, C, D}

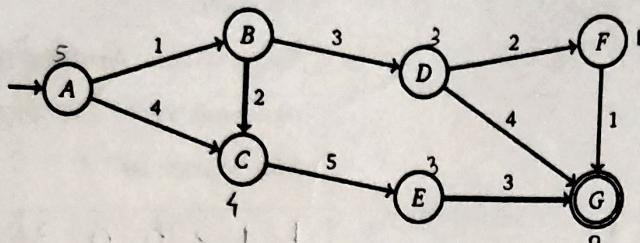
Domain = {1, 2, 3, 4, 5, 6}

Constraint = {A < B, B < C, C < D, B+D=9}

1. Design the constraint graph
2. Determine the resulting domain for variables after the CSP made ARC-Consistent.
3. Consider the resulting domain of variables and find number of valid solutions possible for given CSP.



- Q 2 a** The following is a representation of a search problem, where A is the start node and G is the goal. There is also a heuristics h which is defined in the table. Note that $h(B)$ is unknown. [06] 2 & 2,3,
6 4,6
& 7



n	$h(n)$
A	5
B	?
C	4
D	3
E	3
F	1
G	0

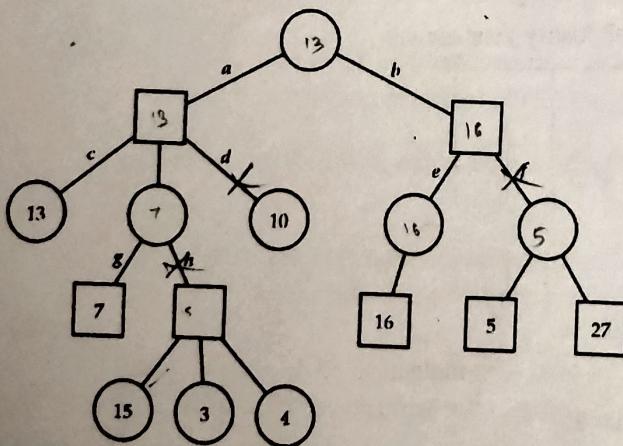
- What values of $h(B)$ makes h admissible?
- For each of the following search strategies, mark (Yes/No) which of the listed paths it could return. Assume that the heuristics h is admissible. Note that for some search strategies, the returned path might depend on tie-breaking. In these cases, make sure to mark all paths that could be returned. Justify your answers.

Search algorithm	A - B - C - E - G	A - B - D - G	A - B - D - F - G
Depth-first	-	-	-
Breadth-first	-	-	-
A • with heuristic h	-	-	-

- Q 2 b** Convert the following sentence in knowledge base using propositional logic and prove that the unicorn is mythical, magical, and horned. [06] 5 & 2,3,
6 4,6
& 7

- If the unicorn is mythical, then it is immortal.
- But if it is not mythical, then it is a mortal mammal.
- If the unicorn is either immortal or a mammal, then it is horned.
- The unicorn is magical if it is horned.

Q3 a



[06] 6 2,3,
4 &
7

Consider the above zero-sum game tree, where circle represents a min nodes and square represents max nodes. Solve the following.

- Obtain the min/max value for every empty node at every step of Min-Max



algorithm.

2. Which branches are prune from the tree using Alpha-Beta pruning algorithm, compute the alpha/beta value for every node at each step.

- Q3 b** Given a set of linearly separable training examples, we train the perceptron algorithm twice, initializing the weights differently for each run. The two training procedures traverse the data points in the same order and are run until convergence. [06] 5 & 2,3,
6 4,6,
& 7

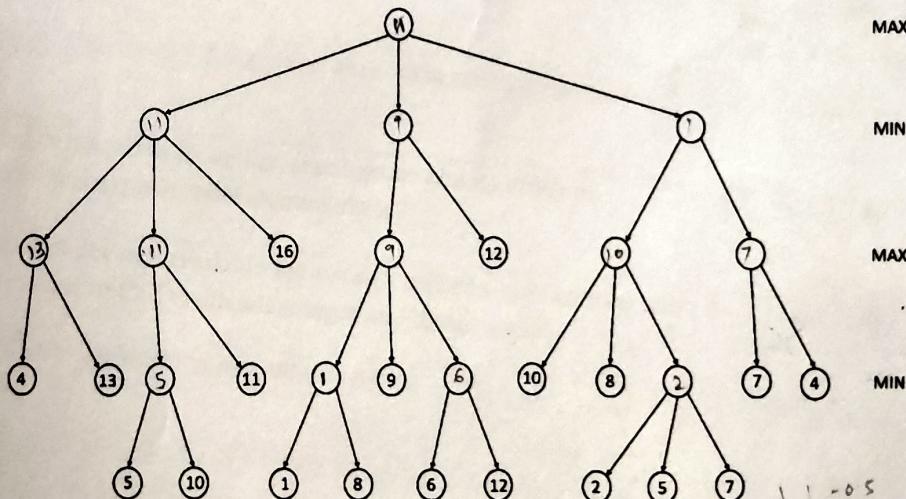
1. Would the two resulting classifiers have the same performance on the training set?

2. Would the two resulting classifiers have the same performance on the test set?

- Q4 a** Represent the following sentences in first-order logic, using a consistent vocabulary [06] 1,2, 1,2,
& 6 3,4,
& 7

- 1) Some students took French in spring 2022.
- 2) Every student who takes French passes it.
- 3) Every person who buys a policy is smart.
- 4) There is an agent who sells policies only to people who are not insured.
- 5) A person born outside the UK, one of whose parents is a UK citizen by birth, is a UK citizen by descent.
- 6) A person born ¹⁹ outside the UK, one of whose parents is a UK citizen by birth, is a UK citizen by descent.

- Q4 b** Use the Alpha-Beta pruning algorithm to prune the game tree above assuming child nodes are visited from left to right. Show all final alpha and beta values computed at the root, each internal node visited, and at the top of pruned branches. Also show the pruned branches. [06] 2 2 &
6



- Q5 a** Design networks of McCulloch-Pitts neurons that implement logical XOR and XNOR gates. Draw each network and label all the weight and threshold values. [06] 6 2,3,
4 &
7
- Write down the equation for the output neuron in terms of its two inputs, its connection weights, and its threshold. Calculate the output for each given two input.

- Q5 b** Draw the AI learning agent diagram. Explain each key components of learning agent with respect to specific AI application. [06] 2,5 2,3,
6 4,6,
& 7



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END Semester Examination

Programme: B. Tech

Semester: V

Course Code:

Course Name: Fundamentals of Robotics

Branch: Computer

Academic Year: 2022-23

Duration: 3 hrs

Max Marks: 60

Student PRN No.

1	1	2	0	0	3	1	0	0
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Instructions:

- Figures to the right indicate the full marks.
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- Writing anything on question paper is not allowed.
- Exchange/Sharing of stationery, calculator etc. not allowed.
- Write your PRN Number on Question Paper.

			Mar ks	CO	PO
Q 1	a	Describe the types of end effector and discuss about magnetic grippers.	7	CO-1	PO-1
	b	How a term 'Robot' is related to its ability, intelligence and its utility in Industrial application and explain robot characteristic?	5	CO-1	PO-1
Q 2	a	List the machine vision devices available for various robotics applications and explain working principal of CCD with advantages and disadvantages	7	CO-2	PO-1
	b	With neat sketch, explain the working of a stepper motor	5	CO-2	PO-4
Q 3	a	Draw and assign the coordinate frames for 4 DOF SCARA robot based on the D-H representation and fill out the DH parameter's tables and write all A matrices.	7	CO-3	PO-2
	b	A frame B is rotated by 60° by about Z axis of A and then translated (2,2,2) units in XYZ direction of A. Given $B_p = (1,1,1)$, Find A_p ?	5	CO-3	PO-4
Q 4	a	Price of robot= 28,50,000, cost of tooling 15 lakh, installation cost=7.5 lakh, investment tax credit= 5 lakh, labour cost= 850/hr, material saving cost=50/hr, robot maintenance cost= 300, no. hours per shift per year=2000, using 8 years tax life salvage value 5 lakh, corporate tax rate 40% calculate payback period	7	CO-4	PO-1



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	b	A single link robot with a revolute joint is motionless at $\Theta = 20^\circ$. It is desired to move the joint in a smooth manner to $\Theta = 80^\circ$ in 4 s. Find a suitable cubic polynomial to generate this motion and bring the manipulator to rest at goal.	5	CO-5	PO-2
Q 5	a	Discuss the characteristics of sensors and explain temperature sensor.	7	CO-6	PO-2
	b	Calculate the size of the vacuum cup which is to be used to lift the 750 N of steel plate having an area of 350 mm X 350 mm. Using a factor of safety 2 suggest proper cup size if two such type of grippers are to be employed to lift the plate by creating 18.5 kPa vacuum pressure (with reference to atm. pressure).	5	CO-6	PO-2



COLLEGE OF ENGINEERING, PUNE
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END Semester Examination

Programme: B.Tech

Semester: V

Course Code: CT (HO)-21001

Course Name: Making Sense of Data

Branch: Computer Engineering

Academic Year: 2022-23

Duration: 3 Hrs

Max Marks: 60

Date: 05/12/2022

Student PRN No.

1 | 1 | 2 | 0 | 0 | 3 | 1 | 0 | 0

Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.

		Marks	CO	PO
Q 1	a What is Data Cleaning Explain one method of Data Cleaning	4	CO 3	PO a
	b Explain Discrete and continuous distribution with example.	4	CO 4	PO a. e
	c Explain any FOUR visualization techniques used in data analytics.	4	CO 5	PO b. c
Q 2	a Explain Steps Involved in Data Preparation and Normalize the following variable using min-max scalar. Variable: 33, 21, 7, 53, 29, 42, 12, 19, 22, 36.	6	CO 2	PO b
	b Uncle Bruno owns a garden with 30 black cherry trees. Each tree is of a different height. The height of the trees (inches): 61, 63, 64, 66, 68, 69, 71, 71.5, 72, 72.5, 73, 73.5, 74, 74.5, 76, 76.2, 76.5, 77, 77.5, 78, 78.5, 79, 79.2, 80, 81, 82, 83, 84, 85, 87. Draw histogram of following Data	6	CO 2	PO b, g
	c An insurance company wanted to understand the time to process an insurance claim. They timed a random sample of 47 claims and determined that it took on average 25 minutes per claim and the standard deviation was calculated to be 3. With a confidence level of 95%, what is the confidence interval?	6	CO 2	PO b, g
Q 3	a	10	CO 1,5	PO b, c

What is Classification explain with example. State each of the following Data analytics tool with its functionalities:

NumPy, Pandas, SciPy, Matplotlib



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- b Explain Supervised and Unsupervised learning. State real life applications of both. 10 CO PO
1,2 a, c
- c Following Data represents the ages for a number of individuals. Calculate the following statistics for the variable Age: ~~25, 52, 45, 70, 24, 47, 68, 77, 45, 28~~. 10 CO 2 PO a, c
1. Mode
 2. Median
 3. Mean
 4. Range
 5. Variance
 6. Std. Deviation



College of Engineering Pune

(An Autonomous Institute of Govt. of Maharashtra)

(MA21001) Probability and Statistics for Engineers

Program : T.Y.B.Tech. (Branches: Computer, E n TC, Mechanical, Electrical, Instrumentation) Sem. V

Academic Year : 2022-23

Examination : End Semester Examination

Maximum Marks : 60

Date : 25/11/2022

Time : 180 Minutes

Student MIS Number :

1	1	2	0	0	3	1	0	0
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Instructions :

1. Write your MIS Number on Question Paper.
2. Writing anything on question paper and on statistical tables is not allowed.
3. Mobile phones and programmable calculators are strictly prohibited.
4. Exchange/Sharing of stationery, calculator etc. is not allowed.
5. Figures to the right indicate the course outcomes and full marks.
6. Unless otherwise mentioned symbols and notations have their usual standard meanings.
7. Any essential result, formula or theorem assumed for answering questions must be clearly stated.
8. Whenever necessary, use statistical tables provided by invigilator to do the statistical calculations.
9. Whenever necessary, write probability answers correct to four decimal places.

1. Consider three pairwise disjoint events E, F, G with $\Omega = E \cup F \cup G$ and $P(E) = 0.2$ and $P(F) = 0.5$. Calculate $P(\bar{F}), P(G), P(E \cap G), P(E \cup F)$. [CO2, 2 Marks]

2. Find probability distribution of the number of heads obtained in 3 flips of a balanced coin. Hence find its mean. [CO2, 2 Marks]

3. The runs scored in a cricket match by 11 players is as given: 7, 16, 121, 51, 101, 81, 1, 16, 9, 11, 16. Find the mean, median, mode and standard deviation of this data. Write step wise code to evaluate mean and standard deviation using R software. [CO2, 4 Marks]

4. A fair six-sided die is rolled twice independently. What is the probability of getting 1 in first roll but not getting 3 or 4 in the second roll? [CO3, 2 Marks]

5. A local drugstore owner knows that, on average, 100 people enter his store each hour. Find the probability that in a given 3-minute period more than 5 people enter the store. Also write R command to calculate the answer. [CO3, 3 Marks]

P.T.O.

6. The probability distribution of X , the number of imperfections per 10 meters of a synthetic fabric in continuous rolls of uniform width, is given by

x	0	1	2	3	4
$f(x)$	0.41	0.37	0.16	0.05	0.01

- (a) Construct the cumulative distribution function of X . [CO1, 1 Mark]
 (b) Find the mean and variance of X . [CO2, 1 Mark]
 (c) How many imperfections do you expect in 1000 meters roll? . [CO4, 1 Mark]
7. If the probability that an individual will suffer a bad reaction from injection of a given serum is 0.001, determine the probability that out of 2000 individuals (a) exactly 3, (b) more than 2 individuals will suffer a bad reaction. Also write R command to calculate both the answers exactly. [CO3, 4 Marks]

8. Four technicians regularly make repairs when breakdown occurs on an automated production line. Janet, who services 20 percent of the breakdowns, makes an incomplete repair 1 time in 20; Tom, who services 60 percent of the breakdowns makes an incomplete repair 1 time in 10; Gorgia, who services 15 percent of the breakdowns makes an incomplete repair 1 time in 10; Peter, who services 5 percent of the breakdowns, makes an incomplete repair 1 time in 20. For the next problem with the production line diagnosed as being due to an initial repair that was incomplete, what is the probability that this initial repair was made by Janet? [CO3, 4 Marks]

9. A public health official claims that the mean home water use is 350 liters a day. To verify this claim, a survey of 20 randomly selected homes gave the following data:
 340, 344, 362, 375, 356, 386, 354, 364, 332, 402, 340, 355, 362, 322, 372, 324, 318, 360, 338, 370. Does the data contradict the official's claim? Use 5 percent level of significance. Use P-value approach to test this hypothesis. Take sample standard deviation, $S = 21.8478$. [CO3, 4 Marks]

OR

A manufacturer of ball pens claims that a certain pen he manufactures has a mean writing life of 400 pages with a standard deviation of 20 pages. A purchasing agent selects a sample of 100 pens and puts them for test. The mean writing life for the sample was found to be 390 pages. Should the purchasing agent reject the manufacturer's claim at 1 percent level of significance?

Yes Reject Ho

[CO3, 4 Marks]

10. A manufacturer of car batteries claims that the life of the company's batteries is approximately normally distributed with a standard deviation equal to 0.9 year. If a random sample of 10 of these batteries has standard deviation of 1.2 years, do you think that $\sigma > 0.9$ years? Use a 0.05 level of significance. [CO3, 3 Marks]

11. Design decision rule to test the hypothesis that a coin is fair if a sample of 64 tosses of the coin is taken and if the level of significance is (a) 0.05 (b) 0.01. [CO3, 4 Marks]

- 147.15
 12. A machine is supposed to mix peanuts, hazelnuts, cashews, and pecans in the ratio 5:2:2:1. A can containing 500 of these mixed nuts was found to have 269 peanuts, 112 hazelnuts, 74 cashews, and 45 pecans. At 0.05 level of significance, test the hypothesis that the machine is mixing the nuts in the ratio 5:2:2:1. [CO3, 3 Marks]

13. The grades of a class of 9 students on a midterm report (x) and on the final examination (y) are as follows:

x_i	77	50	71	72	81	94	96	99	67
y_i	82	66	78	34	47	85	99	99	68

- (a) Estimate the linear regression line. [CO3, 2 Marks]
- (b) Estimate the final grade of a student who received a grade of 85 on the midterm report. [CO2, 1 Mark]
- (c) Construct a 95 percent confidence interval for β . [CO3, 1.5 Marks]
- (d) Test the hypothesis that $\beta = 0$ against the alternative $\beta \neq 0$ at 0.05 level of significance.
Accept H₀ [CO3, 2.5 Marks]

14. State True or False. If False, write the correct statement. [CO4, 4 Marks]

- (a) If S^2 is the variance of a random sample $\{X_1, X_2, \dots, X_n\}$ of size n taken from a normal population having variance σ^2 such that S^2 is an unbiased estimator of σ^2 , then $\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{\sigma^2}$ is a random variable having chi-square distribution with $(n - 1)$ degrees of freedom. \bar{X} : sample mean.
- (b) Let Z be normal and chi-square (χ^2), having ν degrees of freedom be independent. Then $\frac{Z}{\sqrt{\frac{\chi^2}{\nu}}}$ has t-distribution with $(\nu - 1)$ degrees of freedom.
- (c) $\frac{SSR}{(n - 2)}$ is an unbiased estimator of σ^2 . Where SSR: Sum of squares of residuals, n: data size, σ^2 : variance of the random error e .

15. Prove that the probability of a continuous random variable taking a particular value x_0 is zero. [CO4, 2 Marks]

16. The following data represents the number of Statistics lectures attended by 18 students : 9, 12, 18, 14, 12, 14, 12, 10, 16, 14, 13, 15, 13, 11, 13, 11, 9, 11. Perform a sign test to test the instructor's claim that the median of number of lectures attended is 12. Use a 2% level of significance. [CO5, 5 Marks]

17. Which of the following is a true statement? [CO5, 1 Mark]

- (a) A strict-sense stationary process with finite second moments is also wide-sense stationary.
- (b) A wide-sense stationary process with finite second moments is also strict-sense stationary.

18. Consider a stochastic process defined on a finite sample space with two sample points. Its description is provided by the specifications of the two sample functions: $X(T, S_1) = 3 \cos(t)$, $X(T, S_2) = 3 \sin(t)$. Also given probability assignments: $P(S_1) = P(S_2) = \frac{1}{2}$. Find $\mu(t) = E(X(t))$ and finite second moments $R(0) = E(X^2(t))$. Is this process strict sense stationary?, Justify. Is it wide sense stationary?, Justify. [CO5, 3 Marks]



COLLEGE OF ENGINEERING PUNE

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END Semester Examination

Programme: B.Tech

Semester: V

Course Code: 21001

Course Name: Database Management System

Branch: Computer Engineering

Academic Year: 2022-23

Duration: 3 hours

Max Marks: 60

1	1	2	0	0	3	1	0	0
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Student PRN No. Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.

			Marks	C O	PO																
Q1	a	<p>A university registrar's office maintains data about the following entities: (a) courses, including number, title, credits, syllabus, and prerequisites; (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; and (d) instructors, including identification number, name, department, and title.</p> <p>Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.</p> <p>Construct an E-R diagram for the registrar's office. Consider the given mapping constraints: "The entity set course-offering is a weak entity set dependent on course".</p> <p>Make following assumption: "A class meets only at one particular place and time. This E-R diagram cannot model a class meeting at different places at different times".</p>	6	2	b																
Q2	a	<p>The following table has two attributes A and C where A is the primary key and C is the foreign key referencing A with on delete cascade. What is the effect of deleting row (2,4) from table? Draw table for only data values left in table.</p> <table border="1"><tr><th>A</th><th>C</th></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>4</td></tr><tr><td>4</td><td>3</td></tr><tr><td>5</td><td>2</td></tr><tr><td>7</td><td>2</td></tr><tr><td>9</td><td>5</td></tr><tr><td>6</td><td>4</td></tr></table>	A	C	2	4	3	4	4	3	5	2	7	2	9	5	6	4	3	3	b, g
A	C																				
2	4																				
3	4																				
4	3																				
5	2																				
7	2																				
9	5																				
6	4																				
	b	Explain with example what is Super key, Candidate key.			2																



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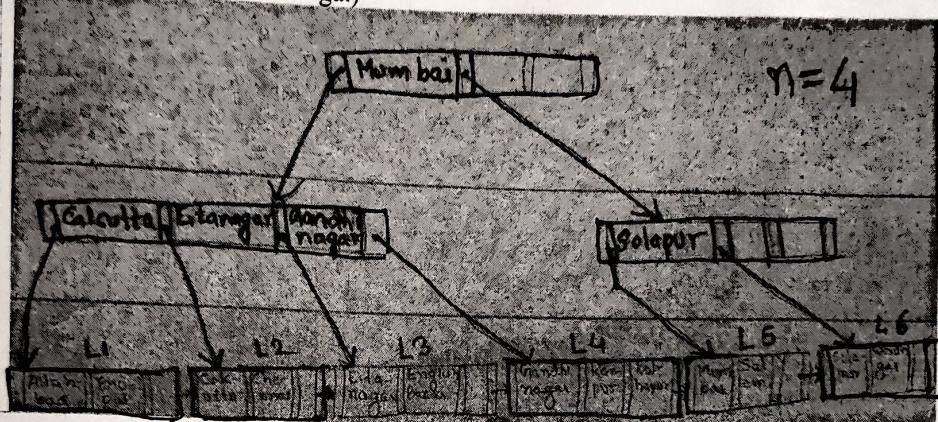
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Q 3	a	<p>Consider three tables $R(a,b,c)$, $S(d,e,f)$, and $T(g,h,i)$. For the relational algebra expression, Construct the correct Equivalent SQL query .</p> <p>Note: DO not use "in", "with", "Natural Join" , (cartesian product allowed), "view", "Nested query" and rename operator. Cartesian product is allowed to use.</p> $\pi_{R.b} (\sigma_{\text{Total} > 2} (R \bowtie \text{count(*)} \rightarrow \text{Total} (R \bowtie R.a = s.d ((\sigma_{S.f} < 50 (S)) \times S.e = T.g (\sigma_{T.h} > 21 (T))))))$	3	3	b, g														
	b	<p>Consider the employee database where the primary keys are underlined. Give an expression in SQL for the following queries.</p> <p>employee (<u>employee-name</u>, street, city)</p> <p>works (<u>employee-name</u>, company-name, salary)</p> <p>company (<u>company-name</u>, city)</p> <p>manages (<u>employee-name</u>, manager-name)</p> <p>Give all employees of First Bank Corporation a 10-percent raise</p> <p>Note : Do not use "join" , "as" and "with", "view" clause .</p>	3																
	c	<p>Consider the employee database as given in Q3 b , where the primary keys are underlined. Give an expression in SQL for the following queries.</p> <p>Find average salary of each company . Output should show company name and its average salary.</p> <p>Do not use "join" , "as" and " with", "view" clause and nested query.</p>	3																
Q4	A	<p>Suppose that we decompose the schema $R = (A, B, C, D, E)$ and following set F of functional dependencies holds: List four candidate keys for R. Show the proof for the same.</p> <p>$A \rightarrow BC$ $CD \rightarrow E$ $B \rightarrow D$ $E \rightarrow A$</p>	4	4	b, d														
	B.	<p>Analyze if the following decomposition of the schema R is a lossless-join decomposition or lossy decomposition.</p> <p>$R1 = (A, B, C)$ $R2 = (C, D, E)$. use the following example of r:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th><th>B</th><th>C</th><th>D</th><th>E</th></tr> </thead> <tbody> <tr> <td>a1</td><td>b1</td><td>c1</td><td>d1</td><td>e1</td></tr> <tr> <td>a2</td><td>b2</td><td>c1</td><td>d2</td><td>e2</td></tr> </tbody> </table>	A	B	C	D	E	a1	b1	c1	d1	e1	a2	b2	c1	d2	e2	4	
A	B	C	D	E															
a1	b1	c1	d1	e1															
a2	b2	c1	d2	e2															
C	<p>With $R1 = (A, B, C)$ $R2 = (C, D, E)$</p> <p>Consider the below given relational schema and set of functional dependencies.</p> <p>$C_B_B = (C, E, B, T)$ candidate key = (C, E)</p> <p>$F = F_C = \{C, E \rightarrow B, T ; E \rightarrow B\}$. Analyze if the given schema is in 3NF ? Is the given schema in BCNF? Provide the reason(s) for the same.</p> <p>Provide the dependency preserving , lossless 3NF deomposition for the same .</p>	4																	



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Q5	a.	Analyze the two different types of ordered indices with example. Can the Non-Clustered indices be sparse indices ? Why ?	6	5	d
	b.	Consider the given B+ tree index file with key values as city names as shown below. The value of $n = 4$ in this case. Design the B+ tree obtained after inserting the value of "Latur" in the tree. In case the names are not clear in picture (in leaf node), the names of city are in ascending order: L1(Allahabad, Bhopal), L2(Calcutta, Chennai), L3(Eitanager, English bazaar), L4(Ghandhinagar, Kanpur, Kolhapur), L5(Mumbai, Salem), L6(Solapur, Warangal)	4		
					
Q6	a.	Consider the following two transactions: T1 : read(A); read(B); if A = 0 then B := B + 1; write(B). T2 : read(B); read(A); if B = 0 then A := A + 1; write(A). Add lock and unlock instructions to transactions T1 and T2, so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock?	6	6	d, g
	b.	Consider two transactions T1 and T2 and four schedules S1, S2, S3, S4 of T1 and T2 as given below. Which of the below schedules are conflict-serializable? Also give its serial equivalent. T1: R1[x]; W1[x]; W1[y]; T2: R2[x]; R2[y]; W2[y]; S1: R1[x]; R2[x]; R2[y]; W1[x]; W1[y]; W2[y] S2: R1[x]; R2[x]; R2[y]; W1[x]; W2[y]; W1[y] S3: R1[x]; W1[x]; R2[x]; W1[y]; R2[y]; W2[y] S4: R2[x]; R2[y]; R1[x]; W1[x]; W1[y]; W2[y]	4		
	c.	With reference to logbased recovery. State the sequence of action to take place when the system performs <checkpoint>.	4		
	d.	Write a short note about recoverable schedule. Provide example for the same <i>recoverable</i>	4		

- END -



COLLEGE OF ENGINEERING PUNE
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END Semester Examination

Programme: B.Tech / M.Tech

Course Code: CT-21005

Branch: Computer Engg. & IT

Duration: 3 Hrs

Student PRN No.

Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
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5. Write your PRN Number on Question Paper.

1 1 2 0 0 3 1 0 0

			Marks	CO	PO
Q 1	a	Explain any 5 terms out of the following (2 Marks each)	10		
	I.	FTP			
	II.	Netmask			
	III.	Bit Error Rate			
	IV.	SNR			
	V.	Subnet			
	VI.	CIDR			
	VII.	MAP			
	b	Explain IPV4 datagram Format with Diagram	5		
	c	How is transport layer connection established and terminated in TCP? Illustrate with state diagrams.	5		
Q 2	a	Answer any Two of the following (5 Marks each)	10		
	I.	With an example, explain use of sequence number for acknowledgement			
	II.	Explain working of VLAN, Types of VLAN and advantages of VLAN			
	III.	Lost Data can be retransmitted in transport, Application or Link layer. What are pro and cons of doing it at each layer?			



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	b	Why does DNS use UDP and not TCP? If Packet is lost during DNS request what are likely issues and what are different alternative to get around those issues ?	5		
	c	Find Network, First Host, Last Host, Broadcast, Next Subnet and Netmask in CIDR for following IP address 10.0.100.24/24	5		
Q 3	a	Explain major 4 wireless links challenges in details OR Explain difference between Selective Repeat and Go-Back-N protocol	6		
	b	Explain IEEE 802.11 Architecture and Frame structure in details	8		
	c	Illustrate the working of OSPF and BGP	6		