[6002]-223

S.E. (A.I.D.S)
STATISTICS
(2019 Pattern) (Semester-IV) (217528)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of calculator is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) The following marks have been obtained by a class of students in 2 papers of mathematics.   **[9]**

Paper I	45	55	56	58	60	65	68	70	75	80	85
Paper II	56	50	48	60	62	64	65	70	74	82	90

Calculate the coefficient of correlation for the above data.

b) Find the quartile deviation and coefficient of quartile deviation of the following frequency distribution.   **[9]**

Marks	<10	10-20	20-30	30-40	40-50	50-60
No. of Students	10	20	30	50	40	30

OR

Q2) a) Determine the eq^{ns} of regression lines for the following data. Also find the value of (i) y for $x = 4.5$ (ii) x when $y = 13$ **[9]**

x	2	3	5	7	9	10	12	15
y	2	5	8	10	12	14	15	16

b) The first four moments of four distribution about the value 4 are 2, 20, 40 and 100 respectively.   **[9]**

i) Obtain the first central moments

ii) Find mean, standard deviation

iii) Find coefficients of skewness and kurtosis

P.T.O.

Q3) a) In a certain company install 2000 LED bulbs on each floor. If LED bulbs have average life of 1000 burning hours with standard deviation of 200 hours. Using normal distribution find what number of LED bulbs might be expected to Fail in 700 hours. **[6]**

(Given : P(0 < z < 1.5) = 0.4332)

b) Between 2 pm to 4 pm the average no of phone calls per minute coming into a switch board of a company is 2.5. Find the probability that during a particular minute there will be **[5]**

i) no phone call

ii) exactly 3 phone calls

c) A dice is thrown 10 times. If getting an odd number is a success. What is the probability of i) 8 sucess ii) At least 6 sucess **[6]**

OR

Q4) a) Weights of 4000 students are found to be normally distributed with mean 50 kg and standard deviation 5 kgs. Find the number of students with weights i) less than 45 kgs ii) between 45 to 60 kgs

(for standard normal distribution z, area under the curve between z = 0 to z = 1 is 0.3413 and that between z = 0 to z = 2 is 0.4772) **[6]**

b) If 10% bolts produced by a machine are defective. Determine the probability that out of 10 bolts choosen at random. **[5]**

i) two will be defective

ii) at most two will be defective.

c) In a continuous distribution density function $f(x) = kx(2 - x), 0 < x < 2$ Find the value of k, mean and variance. **[6]**

Q5) a) Random sample of 400 men and 600 women were asked whether they would have a school near their residence 200 men and 325 women were in favour of proposal. Test the hypothesis that the proportion of men and women in front of proposal is same at 5% level of significance. (Given Z_α = 1.96 at 5% l.o.s) **[6]**

b) The values given below are

i) Observed frequencies of a distribution

ii) The frequencies of a normal distribution having same mean, standard deviation and the total frequency as in a) apply χ^2 test of godness of fit.

a)	1	5	20	28	42	22	15	5	2
b)	1	6	18	25	40	25	18	6	1

(Given χ^2 = 12.592 at 5% l.o.s.) **[6]**

c) Fertilizers A and B are tried respectively on 10 and 8 randomly choosen experimental plots. The yields in the plots were as given below. Test using t-test whether in effects of the fertilizer as reflected in the mean yields. **[6]**

Fertilizers	Yields									
A	8.0	7.6	8.2	7.8	8.3	8.4	8.2	7.8	7.1	8.0
B	7.4	8.1	7.6	8.1	7.5	7.6	7.3	7.2	-	-

(Given $t_{0.05}$ = 2.201 at d.o.f 16)

OR

Q6) a) The average marks in mathematics of a sample of 100 students was 51 with S.D. of 6 marks. Could this have a random sample from the population with average marks 50? **[6]**

(Given z_α = 1.96 at 5% l.o.s.)

b) A coin is tossed 160 times and following are expected and observed frequencies for number of heads.

No of heads	0	1	2	3	4
Expected frequency	17	52	54	31	6
Observed frequency	10	40	60	40	10

Find the χ^2 value. **[6]**

c) In two independent samples of size 8 and 10 the sum of squares deviations of the values form the respective sample means were 84.4 and 102.6. Test whether the difference of variances of the population is significant or not. **[6]**

(Given $F_{0.05}$ = 3.29 at degrees of freedom (7,9))

Q7) a) State and prove Neyman-pearson Fundamental lemma. **[9]**

b) Let p is the probability that a given die shows even number. To test $H_0 : P = \frac{1}{2}$ Vs $H_1 : P = \frac{1}{3}$ following procedure is adopted. Toss the die twice and accept H_0 if both times. It shows even number. Find the probabilities of Type I and Type II error. **[8]**

Q8) a) For distribution **[9]**

$$df = \begin{cases} \beta\, e^{-\beta(x-\gamma)}\, dx\ , & x \geq \gamma \\ 0 & x < \gamma \end{cases}$$

Show that for $H_0 : \beta = \beta_0 = \gamma = \gamma_0$ and $H_1 : \beta = \beta_1 = \gamma = \gamma_1$ is the best critical region is given by

$$\bar{x} = \frac{1}{\beta - \beta_0}\left\{\gamma_1\beta_1 - \gamma_0\beta_0 - \frac{1}{n}\log k + \log\frac{\beta_1}{\beta_0}\right\}$$

b) Write short notes on : **[8]**

i) Critical region and Most powerful critical region.

ii) Level of significance and power of Test.

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[6002]-161

S.E. (Computer/AI & DS)
DATA STRUCTURES AND ALGORITHMS
(2019 Pattern) (Semester - IV) (210252)

*Time : 2½ Hours]*   *[Max. Marks : 70*

Instructions to the candidates:

    1)   Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.

    2)   Assume suitable data, if necessary.

    3)   Draw neat labelled diagram wherever necessary.

    4)   Figures to the right indicate full marks.

Q1) a)   Write an algorithm for depth first traversal of a graph. **[6]**

    b)   Construct the minimum spanning tree (MST) for the given graph using Prim's Algorithm staring from vertex 6. **[6]**
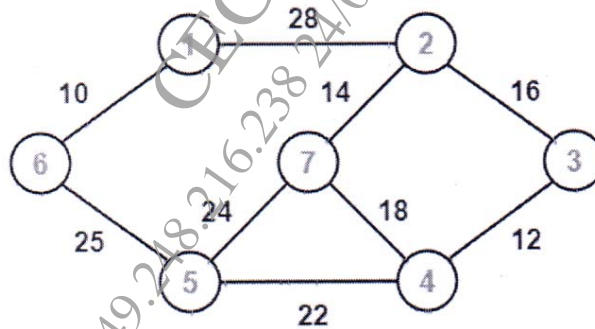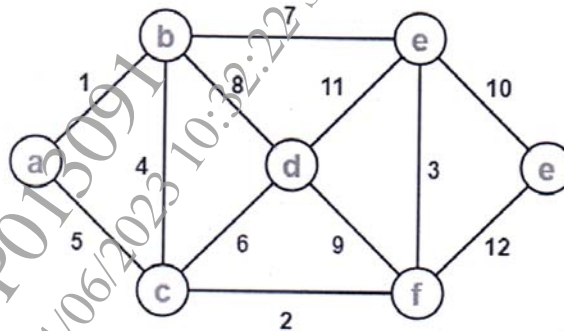

    c)   What is topological sorting? Find topological sorting of given graph. **[6]**
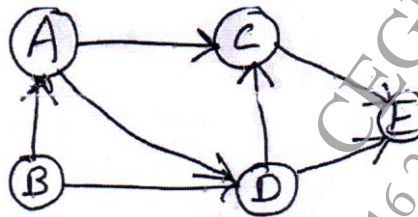
OR

P.T.O.

Q2) a) Write an algorithm for breadth first traversal of a graph. **[6]**

b) Using Prim's Algorithm, find the cost of minimum spanning tree (MST) of the given graph starting from vertex 'a' - **[6]**

c) Define the following terms : **[6]**

i) Complete Graph

ii) Connected Graph

iii) Subgraph

Q3) a) Construct an AVL Tree by inserting numbers from 1 to 8. **[6]**

b) Define Red Black tree. List its properties. Give example of it. **[6]**

c) Write functions for RR and RL rotation with respect to AVL tree. **[6]**

OR

Q4) a) Construct an AVL Tree for following data : **[6]**

50, 25, 10, 5, 7, 3, 30, 20, 8, 15

b) Explain with example K dimensional tree. **[6]**

c) Explain static and dynamic tree tables with suitable example. **[6]**

Q5) a) Construct a B-Tree of order 3 by inserting numbers from 1 to 10. **[9]**

b) Explain following primary index, Secondary index, Sparse index and Dense index with example. **[8]**

OR

Q6) a) Construct a B Tree of order 5 with the following data : **[9]**

D H Z K B P Q E A S W T C L N Y M

b) What is trie tree? Explain insert and search operation on it. **[8]**

[6002]-161   2

Q7) a) Explain multilist files & coral rings. **[9]**

b) What is Sequential and index sequential file organization? State its advantages and disadvantages. **[8]**

OR

Q8) a) Explain inverted file & cellular partitions. **[9]**

b) Explain direct access file organization. State its advantages and disadvantages. **[8]**

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[6002]-224

S.E. (Artificial Intelligence & Data Science)
INTERNET OF THINGS
(2019 Pattern) (Semester-IV) (217529)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Attempt Questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*

   2)   *Draw neat and Clean Diagrams.*

   3)   *Assume suitable data, if necessary.*

Q1) a)   Explain Next Generation Kiosks & smart vending machines in detail?**[9]**

      b)   Justify how the asset management impacts on end to end users by integrating IOT technology?   **[9]**

<p align="center">OR</p>

Q2) a)   Explain in brief Smoke for gas detection and Air quality monitoring?**[10]**

      b)   How is security a big concern in IOT? How do IDS work in IoT?   **[8]**

Q3) a)   Differentiate M2M and IoT? Also differentiate COAP and MQTT?   **[8]**

      b)   Explain the IOT System working block with the help of Control units, Communication Modules and Sensors?   **[9]**

<p align="center">OR</p>

Q4) a)   Explain Link layer protocol like ethernet, Wi-Fi, WiMax, Zigbee in Protocol architecture?   **[9]**

      b)   How information is exchanged in real time without human intervention?**[8]**

Q5) a)   Describe Cloud of Things. Explain how cloud is an integration of Grid Computing and SOA.   **[10]**

      b)   Explain on Devices Security and Privacy of IoT cloud. Why do we need IoT Security?   **[8]**

<p align="center">OR</p>

Q6) a)   Describe the need of semantic web technology and business impacting IoT?   **[10]**

      b)   Explain in detail vulnerabilities of Internet of Things.   **[8]**

Q7) a) Discuss Cloud computing. Explain the setup of a cloud environment in an IoT? **[10]**

b) What are IoT design ethics, explain? **[7]**

OR

Q8) a) How does Vehicle-to-Vehicle (V2V) communication enhance safety and efficiency in the internet of Things (IoT) ecosystem? **[10]**

b) Elaborate on how you will use IoT for remote healthcare. **[7]**

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[6002]-162

S.E. (Computer/A.I.& D.S.)
SOFTWARE ENGINEERING
(2019 Pattern) (Semester - IV) (210253)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right side indicate full marks.*

   4)   *Assume suitable data, if necessary.*

Q1) a)   Explain any four design concepts with appropriate example.   **[9]**

   b)   What is design pattern? How patterns can be used in design?   **[9]**

<div align="center">OR</div>

Q2) a)   Explain the Data-flow architecture and Layered Architecture in detail.

                                                                          [9]

   b)   Explain the golden rules for User Interface Design.   **[9]**

Q3) a)   What question needs to be answered in order to develop a project plan according to W^5HH principle?   **[9]**

   b)   Explain the project management life cycle.   **[8]**

<div align="center">OR</div>

Q4) a)   Explain with appropriate example how schedule can be prepare using PERT.   **[9]**

   b)   List and explain the different metrics in the process and project domain.

                                                                          [8]

Q5) a)   Describe the software quality dilemma in your own words.   **[9]**

   b)   What are the objectives of testing? Explain the different types of testing.

                                                                          [9]

Q6) a) What is software quality? Write the different quality metrics. **[9]**

b) What is test case design? Write the various approaches for test case design. **[9]**

Q7) a) What is SCM? Write short note on SCM Elements. **[9]**

b) What is Risk? Explain the reactive and proactive risk strategies with appropriate examples. **[8]**

OR

Q8) a) Explain the repository features with respect to software configuration management. **[9]**

b) Write short note on CASE TOOLS for software development. **[8]**

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[6002]-225

S.E. (Artificial Intelligence and Data Science)
MANAGEMENT INFORMATION SYSTEM
(2019 Pattern) (Semester - IV) (217530)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions to the candidates:
    1) Answer Q.1 or Q..2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
    2) Neat diagrams must be drawn wherever necessary.
    3) Figures to the right indicate full marks.
    4) Assume suitable data, if necessary

Q1) a)   What is IT infrastructure? Explain management issues.   **[8]**

    b)   Explain role of telecommunication. Internet and wireless technology in Business intelligence.   **[9]**

<div align="center">OR</div>

Q2) a)   What is Business Intelligence? Explain its foundations database and Information management.   **[9]**

    b)   What is IT infrastructure? Explain in brief its components.   **[8]**

Q3) a)   How to enhance decision making with information systems give suitable examples.   **[9]**

    b)   Explain importance of project Management and how to manage project risk.   **[8]**

<div align="center">OR</div>

Q4) a)   Enterprise Application and explain with examples.   **[8]**

    b)   Discuss managing global system with technology issues and opportunities for global value chain.   **[9]**

Q5) a)   Elaborate functional business systen in detail with cross functional enterprise systems.   **[9]**

    b)   Describe e-commerce with its applications and issues.   **[9]**

<div align="center">OR</div>

Q6) a) How to manage Supply chain with business network? **[9]**

b) Explain decision support trends in businesses. How data mining and knowledge management is used in Decision Support Systems. **[9]**

Q7) a) Write short note on

i) Fuzzy Logic

ii) Virtual Reality

iii) Business and AI **[9]**

b) Explain the role of MIS in data science, explore an open source tool to generate reports. **[9]**

OR

Q8) a) Write short note on

i) Intelligent Agents

ii) Genetic Algorithms,

iii) Neural Network **[9]**

b) Explain the value of expert systems with its benefits and limitations **[9]**

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