

CBCS SCHEME

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18SCE/SFC/LNI/SCE/SCS/SCN/SSE/SIT/SAM11

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Mathematical Foundation of Computer Science

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of statistical table permitted.*

Module-1

- 1 a. Explain in brief:
- Significant figures
 - Truncation errors
 - Round off errors
 - Absolute error
 - Percentage errors. (10 Marks)
- b. Perform one iteration of the Bairstow's method to extract a quadratic factor $x^2 + px + q$ from the polynomial $P_3(x) = x^3 + x^2 - x + 2 = 0$. Use the initial approximations $P_0 = -0.9$, $q_0 = 0.9$. (10 Marks)

OR

- 2 a. Find all the roots of polynomial $x^3 - 4x^2 + 5x - 2 = 0$. By Graeffe's root squaring method. (10 Marks)
- b. Using Jacobi's method find all the eigen values of the matrix
- $$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$
- (10 Marks)

Module-2

- 3 a. A simply supported beam carries a concentrated load P at its mid point corresponding to the various values of P . The maximum deflection ' Y ' is measured and is given in the following table:

P	100	120	140	160	180	200
Y	0.45	0.55	0.60	0.70	0.80	0.85

Find a law in the form $Y = a + bP$ and hence estimate Y when $P = 150$ (10 Marks)

- b. Compute the coefficient of correlation and the equation of regression lines for the data:

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(10 Marks)

OR

- 4 a. Fit a non-linear curve of the form $y = ax^2 + bx + c$ in the least square sense for the data and hence estimate y at $x = 6$. (10 Marks)

x	1	2	3	4	5
y	10	12	13	16	19

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b. S.T if 'θ' is the acute angle between the lines of regression then

$$\tan \theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \left(\frac{1-r^2}{r} \right). \text{ Explain the significance if } r=0, r = \pm 1. \quad (10 \text{ Marks})$$

Module-3

5 a. The probability density function of a variate X is

x	0	1	2	3	4	5	6
P(x)	K	3K	5K	7K	9K	11K	13K

Find K, P(X < 4), P(X ≥ 5), P(3 < X ≤ 6) (10 Marks)

b. Find the constant 'K' such that $f(x) = \begin{cases} kx^2, & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$ is a probability density function
 also find: (i) P(1 < x < 2) (ii) P(x ≤ 1) (iii) P(x > 1) (iv) P(x ≤ 2) (v) P(x > 2)
 (vi) Mean and Variance. (10 Marks)

OR

6 a. Two horses A and B were tested according to the time (in seconds) to run a particular race with the following results:

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

Test whether you can discriminate between two horses [$t_{0.05} = 2.2, t_{0.02} = 2.72$ for 11 df]. (10 Marks)

b. The following table gives the number of aircraft accidents that occurred during the various week days of the week. Find the accidents are uniformly distributed over the week.

Days	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Total
No. of accidents	14	16	8	12	11	9	14	84

[Given $\chi^2_{0.05, 6df} = 12.59$] (10 Marks)

Module-4

7 a. Prove that the two graphs shown in Fig.Q.7(a) below are isomorphic. (07 Marks)

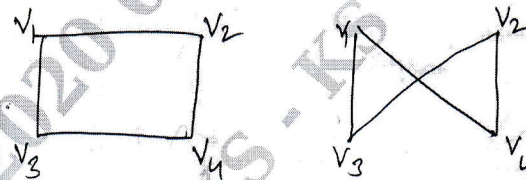


Fig.Q7(a)

b. Show that the complete graphs K2, K3 and K4 are planar graphs. (07 Marks)

c. Find the number of non negative integer solutions of the equation.
 $x_1 + x_2 + x_3 + x_4 = 25$ (06 Marks)

OR

8 a. Define the following:

- i) Hamilton cycle
- ii) Hamilton graph
- iii) Hamilton path. (10 Marks)

b. Find the number of integer solutions of the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 30$ under the constraints $x_i \geq 0$ for $i = 1, 2, 3, 4, 5$ and further x_2 is Even and x_3 is Odd. (10 Marks)

Module-5

- 9 a. i) Define the terms vectorspace and subspace
 ii) If W_1 and W_2 are subspaces of the vectorspace $V(F)$ then $W_1 + W_2$ is a subspace of $V(F)$ (10 Marks)
- b. i) Define the terms Linear span of a set and co-ordinate
 ii) S.T the set $B = \{(1, 1, 0) (1, 0, 1) (0, 1, 1)\}$ is a basis of the vector space $V_3(R)$. (10 Marks)

OR

- 10 a. i) Define the terms Basis and Dimension
 ii) Find the dimension and basis of the subspace spanned by the vectors $(2, 4, 2) (1, -1, 0) (1, 2, 1)$ and $(0, 3, 1)$ in $V_3(R)$ (10 Marks)
- b. i) Define the terms Linear transformation and Matrix of the linear transformation
 ii) Find the matrix of the linear transformation
 $T : V_3(R) \rightarrow V_2(R)$ defined by
 $T(x, y, z) = (x + y, y + z)$ relative to the bases $B_1 = \{(1, 1, 0) (1, 0, 0) (1, 1, 0)\}$
 $B_2 = \{(1, 0) (0, 1)\}$. (10 Marks)

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GBCS SCHEME

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18SCS12

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Advances in Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss the areas in which operating system provides services. (06 Marks)
- b. Differentiate between simple batch processing and multiprogrammed batch processing. (06 Marks)
- c. Explain Linux operating system Kernel components. (08 Marks)

OR

- 2 a. What is a Process? Mention the reasons operating system is responsible for creation of new processes. (05 Marks)
- b. Describe five state process model with neat diagram, also explain the type of events that leads to state transition. (08 Marks)
- c. Explain two general categories of system access threats in operating system and their countermeasures. (07 Marks)

Module-2

- 3 a. Explain user level thread management with its advantages and disadvantages. (08 Marks)
- b. Explain benefits of Microkernel organization. (06 Marks)
- c. With a neat thread transition diagram, explain the thread management in windows operating systems. (06 Marks)

OR

- 4 a. Explain with example differences between Fixed allocation, Local scope, Variable allocation global scope and Variable allocation local scope. (08 Marks)
- b. With a neat diagram, explain address translation in a segmentation system. (06 Marks)
- c. Explain virtual memory addressing in Linux memory management. (06 Marks)

Module-3

- 5 a. Explain the key design issues of multiprocessor operating system. (06 Marks)
- b. List and briefly define five different categories of synchronization granularity. (06 Marks)
- c. Explain popular classes of real time scheduling algorithm. (08 Marks)

OR

- 6 a. Compare Linux and windows scheduling. (08 Marks)
- b. Explain some of the reasons for process migration implementation. (06 Marks)
- c. Explain distributed deadlocks in message communication. (06 Marks)

Module-4

- 7 a. Explain the characteristics of Embedded Operating System. (06 Marks)
- b. Explain in detail Tiny OS components. (06 Marks)
- c. What is eCOS? Explain the various eCOS components with the help of layered structure architecture. (08 Marks)

OR

- 8 a. Define a Computer Virus. List its parts. Explain different phases that a typical virus goes through during its life cycle. (08 Marks)
- b. What is a Bot? List the uses of bots. (06 Marks)
- c. Discuss the following terms: i) Backdoors ii) Trojan Horse. (06 Marks)

Module-5

- 9 a. List the steps performed during the creation of a new process by the fork () system call in Linux. (08 Marks)
- b. Explain the four different mechanisms by which user process can perform IPC using the Kernel. (08 Marks)
- c. Write a short note on Module management in Linux. (04 Marks)

OR

- 10 a. With a neat diagram, explain the windows NT executive process and thread manager. (10 Marks)
- b. With a neat diagram describe the steps followed by a cache manager of windows NT executive in cached read operation. (10 Marks)

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18SCS13

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Advances in Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is data integrity? Explain the types of integrity constraints. (10 Marks)
b. Explain the object definition language (ODL) with an example. (10 Marks)

OR

- 2 a. Discuss the basic types of update operations on relations. (07 Marks)
b. List and explain the three categories of constraints in database. (03 Marks)
c. What is the need for object oriented databases? Explain the features of object oriented database. (10 Marks)

Module-2

- 3 a. What is Hashing? Explain the Internal Hashing technique. (10 Marks)
b. Describe the characteristics of secondary storage devices. (10 Marks)

OR

- 4 a. What do you understand by distributed databases? Give the various advantages and disadvantages of distributed database management systems. (10 Marks)
b. Write short notes on:
(i) Concurrency control
(ii) Recoverability (10 Marks)

Module-3

- 5 a. Discuss the characteristics of many NOSQL and explain how these systems are differs from traditional SQL systems. (10 Marks)
b. What is mongoDB model? Explain with an example. (10 Marks)

OR

- 6 a. Explain the Hadoop Distributed File System (HDFS) with respect to architecture and HDFS preliminaries. (10 Marks)
b. What is Bigdata? Explain with respect to volume, velocity, variety and veracity. (10 Marks)

Module-4

- 7 a. Write short notes on:
(i) Multimedia databases
(ii) Deductive database (10 Marks)
b. What is spatial database? Explain with the help of data types, spatial operators and spatial queries. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Explain the generalized model for active databases and oracle triggers. (10 Marks)
b. Explain the techniques adopted in web usage analysis. (10 Marks)

Module-5

- 9 a. What is the objective of data mining? What is the importance of associative rules for data mining? Explain any one data mining algorithm. (10 Marks)
b. Explain the clustering and classification techniques in data mining. (10 Marks)

OR

- 10 a. What is the use of data warehouse? Discuss the architecture of data warehouse and its functionality in detail. (10 Marks)
b. State and explain the types of knowledge discovered during data mining. (05 Marks)
c. Discuss the applications of data mining. (05 Marks)

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18SCS/SCN14

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Internet of Things

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain IoT framework with respect to high level M₂M system Architecture (HLSA). (10 Marks)
b. Write a note on following IoT Application i) Home Automation ii) Smart metering. (10 Marks)

OR

- 2 a. What is Internet of Things? Explain the role of IPV6 in IoT? (10 Marks)
b. Explain the characteristics of an object. Discuss classification of objects with a diagram. (10 Marks)

Module-2

- 3 a. Write a note on along with a neat sketch
i) Smart card ii) RFID tags. (10 Marks)
b. Explain the RPLROLL routing protocol. (10 Marks)

OR

- 4 a. Explain the request/Response model used in COAP. And list out the advantages of COAP in IoT. (10 Marks)
b. With a neat sketch, describe 3GPP service model and the architecture. (10 Marks)

Module-3

- 5 a. Explain IEEE 802.15.4 acknowledgment frame format and data frame format. (10 Marks)
b. List and explain the advantages of IPV6 over IPV4. (10 Marks)

OR

- 6 a. With a neat sketch, explain the overall network architecture of the Evolved Packet System (EPS) network elements. (10 Marks)
b. Write a note on : i) IPV6 tunneling ii) IPSec in IPV6 (10 Marks)

Module-4

- 7 a. With a neat sketch, explain deployment design of the weather monitoring IoT system. (10 Marks)
b. With a neat sketch, discuss service specification for home automation in IoT system for mode and state service. (10 Marks)

OR

- 8 a. Briefly explain the IoT for agriculture. (10 Marks)
b. Write a Python program for smart parking controller native service. (10 Marks)

Module-5

- 9 a. Describe the steps involved in setting up a Hadoop cluster. (10 Marks)
b. Write a note on : i) Hadoop Map Reduce ii) Hadoop YARN. (10 Marks)

OR

- 10 a. With a neat sketch, explain the components of the spark cluster. (10 Marks)
b. Explain Oozie workflow for computing machine/error code with maximum count. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

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18SCS151

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Advances in Computer Networks

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, describe the process of cost effective resource sharing. (06 Marks)
- b. Suppose a 128 Kbps point-to-point link is set up between Earth and a rover on Mars. The distance from Earth to Mars is approximately 55 Gm and data travels over the link at the speed of light (3×10^8 m/s).
 - i) Calculate the minimum RTT for the link
 - ii) Calculate the delay \times bandwidth product for the link
 - iii) A camera on the rover takes pictures of its surroundings and sends these to Earth. How quickly after a picture is taken can it reach Mission control on Earth? Assume that each image is 5MB in size. (06 Marks)
- c. With neat diagrams, describe stop and wait protocol. (08 Marks)

OR

- 2 a. What is the need of layering? Describe the TCP/IP architecture used for internet based applications. (06 Marks)
- b. With illustrative examples, explain sliding window algorithm along with its benefits and limitations. (08 Marks)
- c. Calculate the total time required to transfer a 1000kB file in the following cases, assuming a RTT of 100ms, a packet size of 1kB and an initial $2 \times$ RTT of "handshaking" before data is sent.
 - i) The bandwidth is 1.5Mbps, and data packet can be sent continuously
 - ii) The bandwidth is 1.5Mbps, but after we finish sending each data packet we must wait one RTT before sending the next.
 - iii) The bandwidth is "infinite" meaning that we take transmit time to be zero and upto 20 packet can be sent per RTT. (06 Marks)

Module-2

- 3 a. With neat diagrams and the routing tables describe the significance of virtual circuit switching in networks. (10 Marks)
- b. What is the need of DHCP? Explain the working of DHCP with suitable diagrams. (06 Marks)
- c. Describe the significance of bridges along with their limitations. (04 Marks)

OR

- 4 a. What is the need of spanning tree algorithm in networks? Describe its working by considering an example network. (10 Marks)
- b. With examples, explain the benefits of sub netting in the internetworking. (04 Marks)

- c. Using the example network given in Fig Q4(c) give the virtual circuit tables for all the switches after each of the following connection is established. Assume that the sequence of connections is cumulative that is, the first connection is still up when the second connection is established and so on. Also assume that the VCI assignment always picks the lowest unused VCI on each link, starting with 0
- Host D connects to Host H
 - Host B connects to Host G
 - Host F connects to Host A

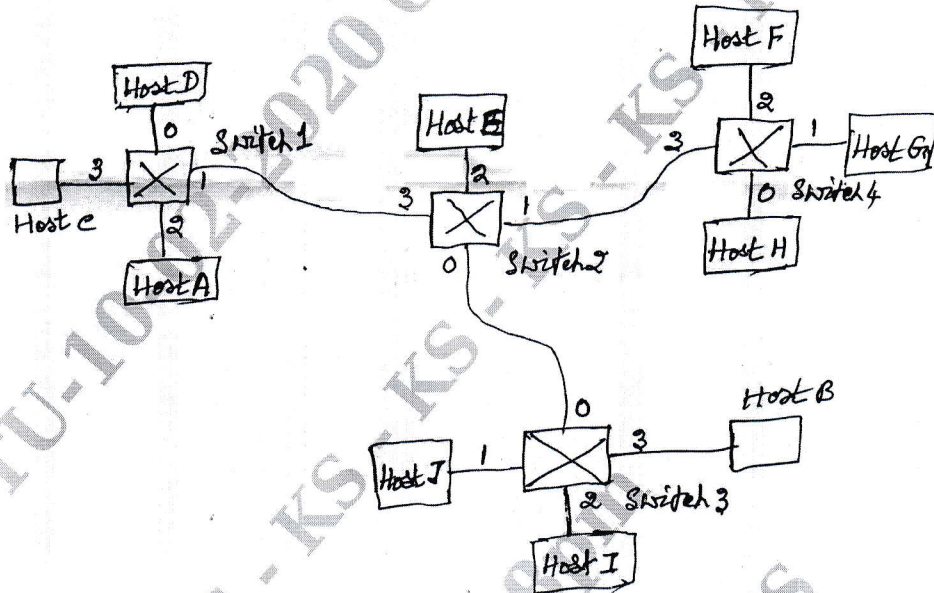


Fig Q4(c)

(06 Marks)

Module-3

- With an example network graph, describe the principle and the working of distance vector routing algorithm in networks. (10 Marks)
 - Describe the feature of IPV6 and header with a neat diagram. (10 Marks)

OR

- List and explain BGP characteristics and path attributes. (06 Marks)
 - Describe the various types of IP multicast. (08 Marks)
 - Write the forward routing table for the given network graph in Fig Q6(c) as it builds the routing database for the node A using link state algorithm

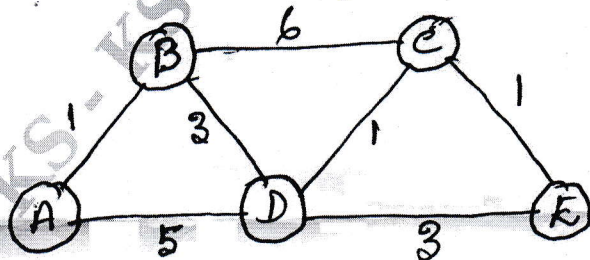


Fig Q6(c)

(06 Marks)

Module-4

- 7 a. Describe the process of TCP oriented reliable byte stream transfer with TCP header, connection establishment/termination and the way flow control has been implemented. (10 Marks)
- b. Explain the various types of queuing disciplines with respect to their working benefits and the limitations. (10 Marks)

OR

- 8 a. Explain the solutions to the silly window problem in TCP oriented network using the various algorithms. (10 Marks)
- b. Describe the following congestion control mechanism in practice : (10 Marks)
- i) Additive increase/multiplicative decrease
 - ii) Slow start.

Module-5

- 9 a. Describe the significance and working of Random Early Detection Congestion Avoidance mechanism. (10 Marks)
- b. Explain the following applications of network in practice : (10 Marks)
- i) Domain Name system
 - ii) World Wide web.

OR

- 10 a. Explain DEC bit and source based congestion avoidance mechanisms. (10 Marks)
- b. Describe the working of Electronic mail and network management in internetworking. (10 Marks)

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18RMI17

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Research Methodology and IPR

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the different types of research, clearly pointing out the difference between an experiment and a survey. (10 Marks)
- b. Distinguish between Research methods and Research methodology. (10 Marks)

OR

- 2 a. Briefly describe the different steps involved in a research process. (15 Marks)
- b. "Empirical research in India in particular creates so many problems for the researchers". State the problems that are usually faced by such researchers. (05 Marks)

Module-2

- 3 a. What is research problem? Define the main issues, which should receive the attention of the researcher in formulating the research problem. (05 Marks)
- b. Describe fully the techniques of defining a research problem with example. (15 Marks)

OR

- 4 a. Summarize the literature review functions in research work and state the way in which it can help research. (05 Marks)
- b. What are the steps involved to conduct literature review for research and explain each one briefly. (15 Marks)

Module-3

- 5 a. Describe fully the important concepts relating to research design. (10 Marks)
- b. Briefly discuss about importance of experimental design. Mention its types and explain any one in each type. (10 Marks)

OR

- 6 a. What are the steps that the researcher should pay attention? While developing a sample design. (10 Marks)
- b. Mention the characteristics of good research sample design and brief about the different types of sample designs. (10 Marks)

Module-4

- 7 a. Write the differences between the collection of research data through questionnaires and schedules. (08 Marks)
- b. Discuss about the selection of appropriate method for research data collection. (06 Marks)
- c. Brief about research case study method and its limitations. (06 Marks)

OR

- 8 a. Mention the different types of research report writing and explain. (08 Marks)
b. What are the precautions that the researcher should take while interpreting his finding? (12 Marks)

Module-5

- 9 a. Discuss about the intellectual property and its rights. (05 Marks)
b. Enumerate the salient features of the Design Act, 2000. (10 Marks)
c. Brief about World Intellectual Property Organization (WIPO). (05 Marks)

OR

- 10 a. Write in brief about the protection of plant varieties and Farmer's Right Act, 2001. (05 Marks)
b. Summarize the salient provisional points in Patents. (10 Marks)
c. What is TRIPS Agreement? Outline the issues and features of the TRIPS agreement. (05 Marks)
