

**B.L.D.E. Association's**

**VACHANA PITAMAHA DR.P.G.HALAKATTI**

**COLLEGE OF ENGINEERING AND TECHNOLOGY, VIJAYAPUR**

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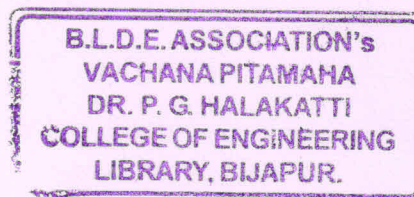
**QUESTION PAPERS**

**1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> SEMESTER**

**M.TECH**

**COMPUTER SCIENCE**

**DEC.2019/JAN.2020**



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**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



- 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)

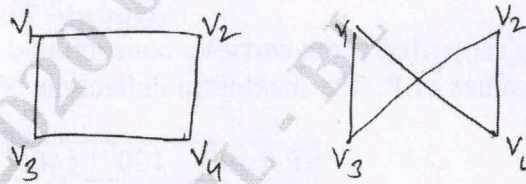


Fig.Q7(a)

- 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)



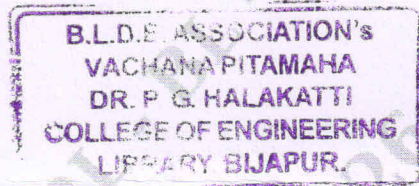
**Module-5**

- 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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**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)

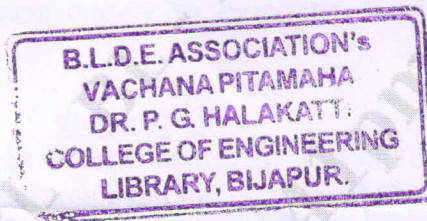
**Module-5**

- 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

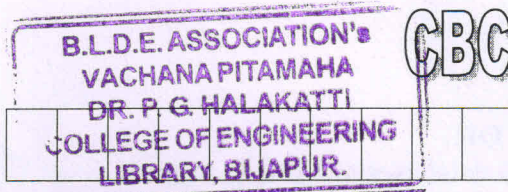
- 10 a. With a neat diagram, explain the windows NT executive process and thread manager. (10 Marks)
- b. With a neat diagram describe the steps followed by a cache manager of windows NT executive in cached read operation. (10 Marks)

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USN



CBCS SCHEME

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)



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)

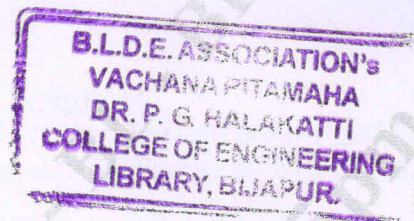
**Module-5**

- 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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**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 M<sub>2</sub>M 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)

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**First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020**  
**Multicore Architecture and Programming**

Time: 3 hrs.

Max. Marks: 100

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

**Module-1**

- 1 a. Distinguish instruction level parallelism and thread – level parallelism, and also elaborate the approaches adopted to support thread level parallelism both in Software and Hardware. (10 Marks)
- b. Explain Hyper – Threading Technology with a block diagram. Also elaborate the Multi – Core architecture with Hyper – Threading Technology. (10 Marks)

OR

- 2 a. With a suitable diagram, explain the relationships between processors, processes and threads in modern operating system. Also discuss the various mapping models used. (10 Marks)
- b. What is virtualization? Describe the different virtualizations used in modern computers. (10 Marks)

**Module-2**

- 3 a. List out the various forms of Decomposition. Explain each in detail. (10 Marks)
- b. Explain the steps involved in Error Diffusion Algorithm with example. Write a 'C' language implementation of Error Diffusion algorithm. (10 Marks)

OR

- 4 a. What is Synchronization? Explain the widely used types of synchronization operations. (05 Marks)
- b. Explain the different lock types required to accomplish the task. (05 Marks)
- c. Discuss the concept of Message Passing Model. (10 Marks)

**Module-3**

- 5 a. With a program in C# language, illustrate the use of windows events to communicate between threads. (08 Marks)
- b. How does AfxBeginThread( ) differs from CreateThread( )? (04 Marks)
- c. Describe the various atomic operations performed by Interlocked function. (08 Marks)

OR

- 6 a. What is Pthread? Explain with an example, how to create and use threads with Pthreads. (10 Marks)
- b. Analyze with example, the use of callbacks in Threadpool to wait on events. (10 Marks)



**Module-4**

- 7 a. What are the challenges involved in threading a loop? Explain any four. (10 Marks)  
b. What is the need of minimizing threading overhead? List the measured costs of a set of OpenMP constructs on a 4 – way Intel Xeon processor based system. (10 Marks)

**OR**

- 8 a. What are the difficulties in debugging an OpenMP program? Mention the guidelines for debugging OpenMP program. (10 Marks)  
b. With a suitable diagram, explain the concept of Task Queuing Execution Model. (10 Marks)

**Module-5**

- 9 a. In parallel programming model too many threads can degrade the performance. Discuss any five scenarios which degrade performance. (10 Marks)  
b. Describe the various way that are used to prevent a low priority thread blocking a high priority thread from running. (10 Marks)

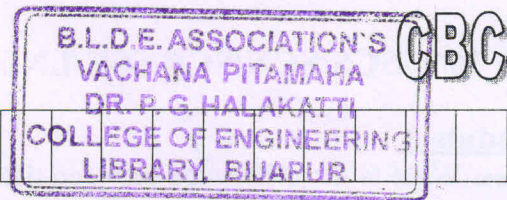
**OR**

- 10 a. Describe any two issues of multicore processors supposed to take care about memory. (10 Marks)  
b. Explain the two common Idioms for using shared memory without a lock. (10 Marks)

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CS



# CBCS SCHEME

USN

16/17SCS/SCN/SCE/SSE/LNI/SFC/SIT14

## First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020

### Probability, Statistics and Queuing Theory

Time: 3 hrs.

Max. Marks: 80

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

#### Module-1

- 1 a. If A is any event, Prove  $P(\bar{A}) = 1 - P(A)$ . (04 Marks)
- b. State and prove Baye's theorem. (06 Marks)
- c. A given lot of 1C chips contain 2% defective chips. Each chip is tested before delivery. The tester itself is not totally reliable. Probability of tester says the chip is good when it really good is 0.95 and chip is defective when it actually defective is 0.94. If a tested device is indicated to be defective, what is the probability that it is actually defective? (06 Marks)

OR

- 2 a. A continuous random variable X has a probability density function  $f(x) = k(1 + x)$ ,  $2 \leq x \leq 5$ , Find  $P(x \leq 4)$ . (05 Marks)
- b. A random variable X has the following distribution,
- |      |   |     |    |     |    |     |    |
|------|---|-----|----|-----|----|-----|----|
| X    | : | -2  | -1 | 0   | 1  | 2   | 3  |
| P(X) | : | 0.1 | K  | 0.2 | 2K | 0.3 | 3K |
- i) Find K ii) Evaluate  $P(X < 2)$ . (05 Marks)
- c. Two balls are drawn at random without replacement from a box containing 2 green, 2 blue, and 1 red ball. If X denotes the number of blue balls drawn and Y denotes the number of red balls drawn, find the joint probability distribution of (X,Y). (06 Marks)

#### Module-2

- 3 a. Write the binomial, Poisson and geometric probability distribution functions along with their mean and variance. (05 Marks)
- b. If X is a binomial distribution RV with  $E(X) = 2$  and  $\text{Var}(X) = 4/3$ , find  $P(X = 5)$ . (05 Marks)
- c. The number of monthly breakdowns of the computer is a RV having a Poisson distribution with mean equal 1.8. Find the probability that this computer will function for a month
- Without a break down
  - With only one breakdown
  - With at least one breakdown. (06 Marks)

OR

- 4 a. Write the uniform, exponential and normal probability distribution functions with their mean and variance. (05 Marks)
- b. The time (in hours) required to repair a machine is exponentially distributed with parameter  $\lambda = 1/3$ . What is the probability that the repair time exceeds 3 hours? (05 Marks)
- c. Random variable X has a uniform distribution with expected value of 10 and standard deviation of  $\sqrt{3}$ . Find :
- $P(X < 9)$
  - $P(10 < X < 15)$
  - $P(X > 12)$ . (06 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.



**Module-3**

- 5 a. State the four types of random processes. What is the difference between deterministic and non-deterministic processes? (04 Marks)
- b. Show that the random process  $x(t) = A \cos(\omega_0 t + \theta)$  is wide sense stationary, if  $A$  and  $\omega_0$  are constants and  $\theta$  is a uniformly distributed RV is  $(0, 2\pi)$ . (06 Marks)
- c. Consider a Markov chain with three possible states 1, 2 and 3 and the following transition probabilities P.

$$P = \begin{bmatrix} \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ \frac{1}{3} & 0 & \frac{2}{3} \\ \frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}$$

- i) Find  $P(X_4 = 3 | X_3 = 2)$
- ii) Find  $P(X_3 = 1 | X_2 = 1)$
- iii) If we know  $P(X_0 = 1) = \frac{1}{3}$ , Find  $P(X_0 = 1, X_1 = 2)$  (06 Marks)

**OR**

- 6 a. Define Poisson process. What is the difference between homogeneous and non-homogeneous process? (04 Marks)
- b. Show that the inter arrival time of a Poisson process with parameter  $\lambda$  has an exponential distribution with mean  $1/\lambda$ . (06 Marks)
- c. Queries presented in a computer database are following a Poisson process of rate  $\lambda = 6$  queries per minute. An experiment consists of monitoring the database for 'm' minutes and recording  $N(m)$  the number of queries presented. What is the probability of
- N queries one minute interval
  - Exactly 6 queries arriving in a one minute interval
  - Less than 3 queries arriving in a half minute interval. (06 Marks)

**Module-4**

- 7 a. Write a procedure for testing of hypothesis. (05 Marks)
- b. What is the test metric for tests of significance of the difference between
- Sample proportion and population proportion
  - Two sample proportions
  - Sample mean and population mean. (06 Marks)
- c. A coin was flipped 60 times and came up heads 38 times. At the 0.10 level of significance, is the coin biased toward heads? Show your decision rule and calculations ( $z_{0.10} = 1.28$ ). (05 Marks)

**OR**

- 8 a. The mean lifetime of a sample of 25 bulbs is found to be 1550 hours with SD of 120h. The company manufacturing the bulbs claims the average life of the bulbs is 1600h. Is the claim acceptable at 5% LOS? ( $t_{0.05} = 1.71$ ) (05 Marks)
- b. The following data give the number of air-craft accidents that occurred during the various days of a week.

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	15	19	13	12	16	15

Test whether the accidents are uniformly distributed over the week ( $\chi_{0.05}^2 = 11.07$ ). (06 Marks)



- c. A sample of size 13 gave an estimated population variance of 3.0, while another sample of size 15 gave an estimate of 2.5, could both samples be from populations with the same variance? ( $F_{0.05}(12, 14) = 2.53$ ). (05 Marks)

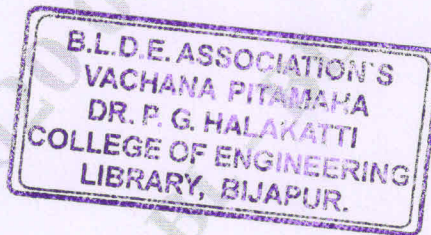
**Module-5**

- 9 a. Explain symbolic representation a/b/c:d/e of the queuing model. (05 Marks)  
b. State Little's Law regarding  
i) The number of customers in the system  
ii) Number of customers in the queue  
iii) Average waiting time in the system  
iv) Average waiting time in the queue. (05 Marks)  
c. Suppose the customers arrive at Poisson rate of one per every 12 minutes and that the service time is exponential at a rate of one service per 8 minutes. What is  
i) The average number of customers in the system  
ii) The average time a customer spends in the system. (06 Marks)

**OR**

- 10 a. In a public telephone booth having just one phone, the arrivals are considered to be Poisson with the average of 15 per hour. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes. Find the  
i) Average number of customers waiting in the system  
ii) Average number of customers waiting in the queue  
iii) Probability that a person arriving at the booth will have to wait in the queue. (06 Marks)  
b. A petrol pump station has 4 pumps. The service times follow the exponential distribution with a mean 6 min and cars arrive for service in a Poisson process at the rate of 30 cars per hour. For what percentage of time would a pump be idle on an average? (06 Marks)  
c. Explain birth – death process. (04 Marks)

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**Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020**  
**Advanced Algorithms**

Time: 3 hrs.

Max. Marks: 80

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

**Module-1**

- 1 a. Define three asymptotic notation use to determine the running time of an algorithm. (06 Marks)
- b. Apply recursion tree method to find solution to the recurrence  $T(n) = 3T(n/3) + Cn$ , where C is a constant. Use the substitution method to verify your answer. (10 Marks)

**OR**

- 2 a. Define amortized analysis. Explain accounting method with an example. (10 Marks)
- b. Define Master theorem. Solve  $T(n) = 9T(n/3) + n$  using the same. (06 Marks)

**Module-2**

- 3 a. Find the single source 'S' shortest path using Bellman-Ford algorithm for the given graph. Write the analysis of the algorithm. (Refer Fig.Q.3(a)) (10 Marks)

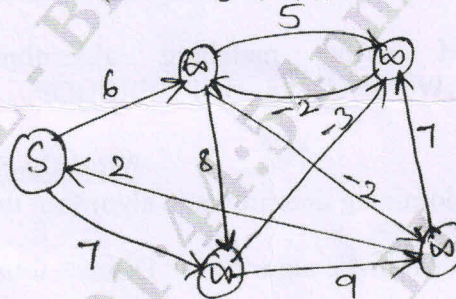


Fig.Q.3(a)

- b. Explain an efficient polynomial multiplication process with neat diagram. (06 Marks)

**OR**

- 4 a. Explain the Johnson's algorithm and apply the same for the following graph: (Refer Fig.Q.4(a)) (10 Marks)

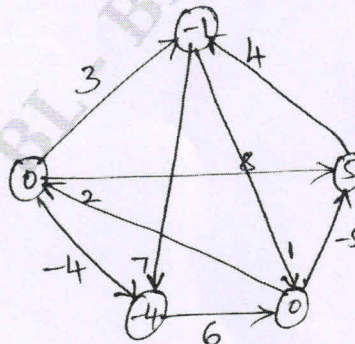


Fig.Q.4(a)

- b. Define FFT, DFT and butterfly operation. (06 Marks)

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Module-3

- 5 a. Give extended Euclid algorithm to find GCD of integers and apply the algorithm for (99, 78). (08 Marks)  
b. Define Group. When it is called abelian group? Give a table for group operation multiplication modulo 15 and show that it is an abelian group. (08 Marks)

**OR**

- 6 a. Explain Chinese remainder theorem. Find all possible solutions for the set of equations:  
 $a \equiv 2 \pmod{5}$   
 $a \equiv 3 \pmod{13}$  (08 Marks)  
b. Write RSA public key cryptosystem algorithm and solve the following problem with  $p = 11$ ,  $q = 29$ ,  $n = 319$  and  $C = 3$  find the value of  $d$  and encrypt the message 100. (08 Marks)

Module-4

- 7 a. Write a Robin-Karp string matching algorithm. Search for a pattern 65358 in the Text string 3141592653589793 with  $q = 11$ . (08 Marks)  
b. Discuss KMP matcher algorithm with steps. Find pattern 001002 in text 001001002000100201 (08 Marks)

**OR**

- 8 a. Explain Finite-Automation-Matcher algorithm and construct the string matching automation for pattern  $P = ababaca$  and illustrate its operation on the text string  $T = abababacaba$ . (10 Marks)  
b. Apply BM string matching algorithm on pattern  $P = BARBER$  and  $T = JIM\_SAW\_ME\_IN\_A\_BARBERSHOP$  (06 Marks)

Module-5

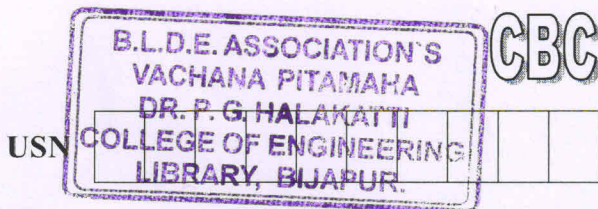
- 9 a. Explain randomizing deterministic algorithm taking Quick sort algorithm as example. (08 Marks)  
b. What are probabilistic algorithms? Discuss four types with example. (08 Marks)

**OR**

- 10 a. Explain in detail the Miller-Rabin Randomized primality testing algorithm. (08 Marks)  
b. Explain Monte-Carlo and Las Vegas algorithms with appropriate examples. (08 Marks)

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## Third Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Application and Web Security

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Explain common web application functions and benefits of web applications. (10 Marks)  
b. Write a note on security mechanisms that are used for handling user access. (10 Marks)

OR

- 2 a. With a neat diagram, explain an application using boundary validation of multiple stages of processing. (10 Marks)  
b. Explain handling attackers. (10 Marks)

### Module-2

- 3 a. What is HTTP protocol? Explain HTTP request phase with header fields. (10 Marks)  
b. Define status codes. Explain various status codes of HTTP response message. (10 Marks)

OR

- 4 a. Explain web services with an example. (10 Marks)  
b. Explain unicode encoding and HTML encoding. (10 Marks)

### Module-3

- 5 a. Write a note on web spidering. (10 Marks)  
b. With a neat diagram, explain the mapping of the functional paths with in a web application. (10 Marks)

OR

- 6 a. Explain URL file paths and request parameters with examples in identifying entypoints for user input. (10 Marks)  
b. Explain the concept of mapping the attack surface. (10 Marks)

### Module-4

- 7 a. Write a note on :  
i) Bad passwords  
ii) Brute forceible login  
iii) Verbose failure messages in the case of design flaws in authentication mechanism. (10 Marks)  
b. Explain in detail forgotten passwords functionality. (10 Marks)

OR

- 8 a. Write a note on common vulnerabilities and explain three main types of attacks against access controls. (10 Marks)  
b. Explain insecure access control methods. (10 Marks)

### Module-5

- 9 a. Discuss Bypassing a login procedure. (10 Marks)  
b. Write a note on Finger-pointing the database. (10 Marks)

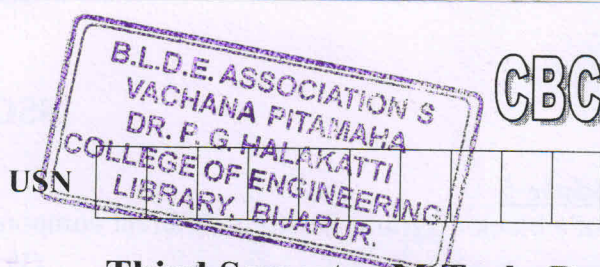
OR

- 10 a. Explain Bypassing filters. (10 Marks)  
b. Write a note on parameterized queries. (10 Marks)

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# CBCS SCHEME

18SCS321

## Third Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Embedded Computing Systems

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Explain components of embedded system hardware with a neat diagram. (08 Marks)
- b. Write short notes on examples of embedded system. (04 Marks)
- c. Explain about embedded system design process. (08 Marks)

OR

- 2 a. Explain in brief about microprocessors and micro controllers. (08 Marks)
- b. Illustrate the design process of an ACVM embedded system. (08 Marks)
- c. Explain any four challenges in embedded system design. (04 Marks)

### Module-2

- 3 a. Describe in detail about UART and HDLC protocol. (08 Marks)
- b. Write short notes on parallel interfacing with touch screen and LCD controller with diagram. (08 Marks)
- c. Discuss in brief about synchronous, ISO-synchronous and Asynchronous communications from serial devices. (04 Marks)

OR

- 4 a. Discuss in detail about the any 4 serial bus communication protocols with neat diagram. (10 Marks)
- b. Write short notes on various wireless and mobile system protocols. (10 Marks)

### Module-3

- 5 a. Explain programmed I/O Busy-wait approach without interrupt service mechanism. (10 Marks)
- b. Demonstrate the steps involved in context switching interrupt latency and dead line. (10 Marks)

OR

- 6 a. Discuss the working of DMA transfer in an embedded system, with a neat diagram. (10 Marks)
- b. Write short notes on device driver programming and writing physical device-driving ISR's in a system. (10 Marks)

### Module-4

- 7 a. Distinguish between function, ISR and tasks. (10 Marks)
- b. Briefly explain about shared data problem solutions. (10 Marks)

OR

- 8 a. What are counting semaphores how to use P and V semaphore function for bounded buffer problem solution. (10 Marks)
- b. Define process and task with their states. (10 Marks)



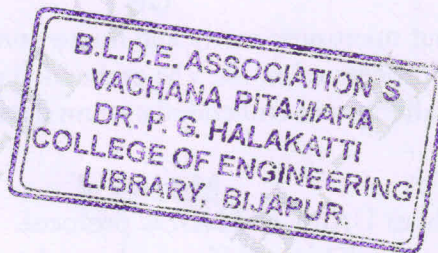
**Module-5**

- 9 a. What is the target system with the help of a block diagram, illustrate different components of the system. (10 Marks)
- b. Mention the various scheduling models and explain the cyclic and Round Robin with Time Slicing scheduling models. (10 Marks)

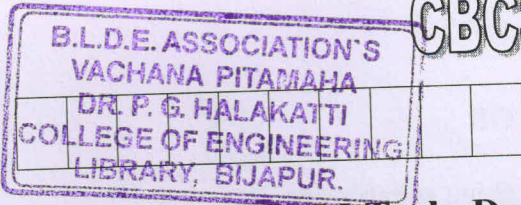
**OR**

- 10 a. Explain in detail about Earliest DeadLine First (EDF) and Rate Monotonic Schedulers (RMS). (10 Marks)
- b. What is RTOS? Explain the design principles when using in RTOS to design an embedded system. (10 Marks)

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**Third Semester M.Tech. Degree Examination, Dec.2019/Jan.2020**  
**Machine Learning Techniques**

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 Machine learning? Mention any three issues in Machine learning. (04 Marks)  
 b. List the different steps to design a learning system. Explain any two in brief. (06 Marks)  
 c. Write the candidate Elimination algorithm. Find specific and generic hypotheses for the concept enjoy sport given below. (10 Marks)

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

OR

- 2 a. Explain ID3 algorithm for decision tree learning. (10 Marks)  
 b. Consider the following set of training examples:

Instance	Classification	a <sub>1</sub>	a <sub>2</sub>
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

- i) What is the Entropy of these examples with respect to the target function classification?  
 ii) What is the information gain of a<sub>2</sub> and a<sub>1</sub>?  
 iii) Which will be selected as the root node a<sub>2</sub> or a<sub>1</sub>? (10 Marks)

**Module-2**

- 3 a. Explain gradient descent algorithm for training a linear unit. Also derive gradient descent rule. (10 Marks)  
 b. Derive Back propagation rule considering output unit weights and hidden unit weights. (10 Marks)

OR

- 4 a. Explain a prototypical Genetic Algorithm. (10 Marks)  
 b. Discuss about common operators for Genetic Algorithm with example. (10 Marks)

**Module-3**

- 5 a. Explain Naïve Bayes algorithm for learning and classifying text. (10 Marks)  
 b. What is Bayesian Learning? Discuss the features of Bayesian learning method. (06 Marks)  
 c. Determine h<sub>MAP</sub> from Bayes theorem. (04 Marks)

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OR

- 6 a. Explain EM algorithm in detail. (10 Marks)  
b. Describe Bayesian Belief Networks by taking suitable example. (10 Marks)

**Module-4**

- 7 a. Explain K-Nearest Neighbor algorithm for approximating a discrete-valued function  $f: \mathbb{R}^n \rightarrow v$ . (10 Marks)  
b. Explain case based reasoning by taking suitable example. (10 Marks)

OR

- 8 a. Describe basic FOIL algorithm in detail. (10 Marks)  
b. Write a note on Locally Weighted Linear Regression. (10 Marks)

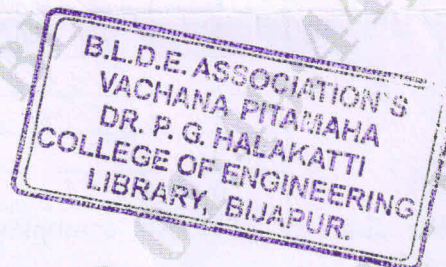
**Module-5**

- 9 a. Define Q function. Explain algorithm for Q learning by taking suitable example. (10 Marks)  
b. What is reinforcement learning? How reinforcement learning problem differs from other function approximation tasks. (10 Marks)

OR

- 10 a. Compare Inductive learning and Analytical learning by giving suitable illustration. (10 Marks)  
b. Explain the explanation based learning algorithm PROLOG-EBG. (10 Marks)

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**Fourth Semester M.Tech. Degree Examination, Dec.2019/Jan.2020**  
**Machine Learning Techniques**

Time: 3 hrs.

Max. Marks: 80

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

**Module-1**

- 1 a. What is Machine Learning? Explain final design of Checker's Learning Program. (08 Marks)  
b. Explain Candidate Generation Algorithm. (08 Marks)

**OR**

- 2 a. Explain with neat diagram, inductive bias of candidate elimination algorithm. (08 Marks)  
b. Describe the characteristics of decision tree learning. (08 Marks)

**Module-2**

- 3 a. Describe the characteristics of neural network learning. (08 Marks)  
b. Explain the Back-Propagation Algorithm. (08 Marks)

**OR**

- 4 a. Briefly explain Alternative Error functions. (08 Marks)  
b. Explain with neat diagram, recurrent networks. (08 Marks)

**Module-3**

- 5 a. Define Bayes Theorem. Describe summary of basic probability formulas in Bayes theorem. (08 Marks)  
b. Explain Conditional Independence in Bayesian belief networks. (08 Marks)

**OR**

- 6 a. Explain the Estimation of Means of K-Gaussians in EM algorithm. (08 Marks)  
b. Briefly explain the Weighted Majority algorithm. (08 Marks)

**Module-4**

- 7 a. Explain K-Nearest neighbor algorithm for discrete valued functions. (08 Marks)  
b. Describe Locally Weighted Linear Regression. (08 Marks)

**OR**

- 8 a. Describe Sequential Covering Algorithm. (08 Marks)  
b. Explain Generating Candidate Specialization in FOIL. (08 Marks)

**Module-5**

- 9 a. Explain the Explanation based Learning Algorithm PROLOG – EBG. (08 Marks)  
b. Explain the key properties of Explanation Based Algorithm. (08 Marks)

**OR**

- 10 a. Explain the different methods in hypothesis space search. (08 Marks)  
b. Explain the Q-Learning Algorithm. (08 Marks)

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