B.L.D.E Association"s

VACHANA PITAMAHA DR.P.G.HALAKATTI

COLLEGE OF ENGINEERING AND TECHNOLOGY ,VIJAYPUR

LIBRARY AND INFORMATION CENTER

QUESTION PAPERS

1st , 2nd & 4th SEMESTER

M.Tech

COMPUTER SCIENCE

DEC. 2018/JAN. 2019

INDEX

mTech CS

CBCS SCHEME

USN | | | | | | | | | | |

18SCS12

First Semester M.Tech. Degree Examination, Dec.2018/Jan.2019
Advances in Operating Systems

Time: 3 hrs. Max. Marks: 100

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

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-1

1 a. List the operating system typical services and explain evolution of operating system. **(10 Marks)**
b. With a neat diagram explain the architecture of window vista. **(10 Marks)**

OR

2 a. What is process? Explain two state process and five-state process model. **(08 Marks)**
b. Explain security issues in design of operating system. **(07 Marks)**
c. Explain the UNIX SVR4 process management. **(05 Marks)**

Module-2

3 a. Explain the key benefits of threads derive from the performance implications. **(05 Marks)**
b. Explain the categorization of thread implementation with advantages and disadvantages. **(08 Marks)**
c. Explain the benefits of a microkernel organization. **(07 Marks)**

OR

4 a. Write typical memory management formats. **(05 Marks)**
b. Explain the operating system policies for virtual memory. **(10 Marks)**
c. Explain Linux/UNIX memory management. **(05 Marks)**

Module-3

5 a. Explain design issues of scheduling on a multi processor. **(05 Marks)**
b. Explain the proposals for multi processor thread scheduling and processor assignment. **(08 Marks)**
c. Explain the unique requirements of the real – time operating systems. **(07 Marks)**

OR

6 a. Explain the popular classes of real-time scheduling algorithms. **(08 Marks)**
b. Explain the Linux scheduling. **(05 Marks)**
c. Write the comparison of windows/Linux scheduling. **(07 Marks)**

Module-4

7 a. Discuss some of the key characteristics of an embedded operating system. **(10 Marks)**
b. What is eCOS? Explain the various eCOS components with help of layered structure architecture. **(10 Marks)**

OR

8 a. With a neat diagram explain the components of Tiny OS. **(10 Marks)**
b. List and explain the key categories of malicious software. **(10 Marks)**

Module-5

9 a. Explain the different mechanisms by which a user process can perform IPC using the kernel. **(10 Marks)**
b. With a neat diagram explain the process and resource management organization in Linux. **(10 Marks)**

OR

10 a. Explain with figure how traps, interrupts and exceptions are handled by the windows NT/2000 organization. **(10 Marks)**
b. Explain the windows NT trap modules with a block diagram. **(10 Marks)**

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m.Tech
CS

CBCS SCHEME

USN | | | | | | | | | | |

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

First Semester M.Tech. Degree Examination, Dec.2018/Jan.2019
Mathematical Foundation of Computer Science

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Perform one iteration of the Bairstow method to extract a quadratic factor of the form $x^2 + px + q$ from the equation $x^3 + x^2 - x + 2 = 0$. Use initial approximations $P_0 = -0.9$ and $q_0 = 0.9$. **(10 Marks)**

b. Using Jacobi method, find all the eigen values and the corresponding eigen vectors of

$$A = \begin{pmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{pmatrix}.$$ **(10 Marks)**

OR

2 a. Find all the roots of the polynomial $x^4 - x^3 + 3x^2 + x - 4 = 0$ using Graeffe's root squaring method. **(10 Marks)**

b. Transform $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$ to tridiagonal form by Given's method. **(10 Marks)**

Module-2

3 a. Psychological tests of intelligence and of engineering ability were applied to 10 students. Here is a record of ungrouped data showing intelligence ratio (IR) and engineering ratio (ER). Calculate the co-efficient of correlation. **(10 Marks)**

Student	A	B	C	D	E	F	G	H	I	J
IR	105	104	102	101	100	99	98	96	93	92
ER	101	103	100	98	95	96	104	92	97	94

b. Fit a second degree parabola $y = a + bx + cx^2$ to the following data. **(10 Marks)**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

OR

4 a. The two regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.5x$. Find i) Mean of x's ii) Mean of y's iii) the correlation coefficient between x and y. **(10 Marks)**

b. Fit curve of the form $y = ax^b$ to the given data. **(10 Marks)**

x	350	400	500	600
y	61	26	7	26

Module-3

5 a. Explain i) Discrete random variable ii) Continuous random variable. **(10 Marks)**

b. Five dice were thrown 96 times and the numbers 1, 2 or 3 appearing on the face of the dice follows the frequency distribution as below :

No. of dice showing 1, 2 or 3	5	4	2	1	0	3
Frequency	7	19	24	8	3	35

Test the hypothesis that the data follows a binomial distribution. Given that $X^2_{0.05} = 11.07$ for 5 df. **(10 Marks)**

OR

6 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, $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$. **(10 Marks)**

b. A certain stimulus administered to each of the 12 patients resulted in the following change in blood pressure 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4. Can it be concluded that the stimulus will increase the blood pressure? Given that $t_{0.5}$ for $11 d_f$ is 2.201. **(10 Marks)**

Module-4

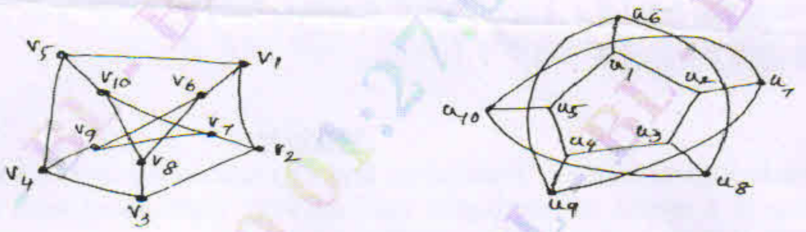
7 a. Define i) Hamilton cycle ii) Hamilton graph iii) Hamilton path. **(10 Marks)**

b. Prove that the vertices of every connected simple planar graph can be properly coloured with five colours. **(10 Marks)**

OR

8 a. Find the number of non negative integer solutions of the equation $x_1 + x_2 + x_3 + x_4 = 25$. **(10 Marks)**

b. Verify whether the following two graphs are isometric or not. **(10 Marks)**



Module-5

9 a. Verify the vectors $\alpha_1 = (1, 0, -1)$, $\alpha_2 = (1, 2, 1)$ and $\alpha_3 = (0, -3, 2)$ are linearly independent. Also find whether these vectors forms a basis for R^3? **(10 Marks)**

b. The vectors $\alpha_1 = (1, 2)$, $\alpha_2 = (3, 4)$ are linearly independent and form a basis for R^2. If a transformation exists from R^2 into R^3 such that $T\alpha_1 = (3, 2, 1)$ and $T\alpha_2 = (6, 5, 4)$, then show that it is linear. **(10 Marks)**

OR

10 a. Let F be a subfield of the complex numbers. Consider the matrix

$P = \begin{pmatrix} -1 & 4 & 5 \\ 0 & 2 & -3 \\ 0 & 0 & 8 \end{pmatrix}$. Clearly the columns of P, the vectors $\alpha_1^1 = (-1, 0, 0)$, $\alpha_2^1 = (4, 2, 0)$,

$\alpha_3^1 = (5, -3, 8)$ form a basis B of F^3. Express the coordinates x_1^1 , x_2^1 , x_3^1 of the vector in the basis B $\alpha = (x_1^1, x_2^1, x_3^1)$ in terms of x_1, x_2, x_3. Also express (3, 2, 8) in terms of α_1^1 , α_2^1 , α_3^1. **(10 Marks)**

b. Find the basis for the eigen space of the linear transformation $T : R^2 \rightarrow R^2$ defined by $T(x, y) = (x + y, y)$. **(08 Marks)**

CBCS SCHEME

USN | | | | | | | | | | |

16/17SCS/SCN/SCE/SSE/SFC/SIT/LNI14

First Semester M.Tech. Degree Examination, Dec.2018/Jan.2019
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. Each coefficient in the equation $ax^2 + bx + c = 0$ is determined by throwing an ordinary dice. Find the probability that equation will have real roots. **(06 Marks)**

b. The probability that a contractor will get plumbing contract is 2/3 and probability that he will not get an electric contract is 5/9. If probability that he will get any one of the contract is 4/5 what is probability that he will get any one of the contract. **(04 Marks)**

c. In a certain recruitment test, there are three multiple choice questions. There are four possible answers to each question and of which, one is correct. An intelligent student knows 80% of the answers, what is the probability that student answers given question correctly. prove that : $P(A \cap \overline{B}) / C) + P(A \cap B / C) = P(A / C)$. **(06 Marks)**

OR

2 a. Probability of man hitting target is $\frac{1}{3}$. How many times must he fire so that probability of hitting target one is more than 90%. **(05 Marks)**

b. A lot of 10 items contains 3 defectives from which a sample of 4 items is drawn without replacement, let X be random variable being the number of defective items in the sample. Find : i) probability distribution of x, ii) $P(x < 1)$ iii) $P(0 < x < 2)$. **(05 Marks)**

c. If the joint probability density function of x and y is given by :

$$f(x,y) = \begin{cases} 24xy & \text{for } 0 < x < 1, \quad 0 < y < 1, \quad x + y < 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find $P(x + y < \frac{1}{2})$. **(06 Marks)**

Module-2

3 a. For a binomial distribution, mean is 6 and standard deviation is $\sqrt{2}$. Find first two terms of the distribution. **(04 Marks)**

b. Prove that Poisson distribution is well defined. The monthly break downs of a computer is a random variable having Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month :
i) without breakdown ii) with only one breakdown iii) with atleast one breakdown. **(06 Marks)**

c. Prove memory less property of a geometric distribution. A panel of judges is to decide which of 2 final contestants A and B will be declared winner. A simple majority of judges will determine winner. Assume that 4 of judges will vote for A and other 3 vote for B. If we randomly select 3 of judges and seek their verdict what is probability that majority will favor? **(06 Marks)**

OR

4 a. Derive expressions for mean and variance of a uniform distribution. **(05 Marks)**

b. Find the moment generating function of an exponential variable and hence find its mean and variance. **(06 Marks)**

c. The weekly wages of 1000 workmen are normally distributed around mean of Rs.500 with standard deviation of Rs. 50. Estimate number of workers, whose weekly wages will be.

i) Between Rs. 400 and Rs. 600

ii) More than Rs. 600

iii) Less than Rs. 400. **(05 Marks)**

Module-3

5 a. State the four types of stochastic processer consider a random process x(t) defined by : $x(t) = A\cos(\omega t + \theta)$

where A and θ are independent and uniform random variables over $(-k, k)$ and $(-\pi, \pi)$ respectively. Find :

i) mean of x(t)

ii) auto correlation function $R_{xx}(t_1, t_2)$ of x(t)

iii) auto covariance function $C_{xx}(t_1, t_2)$ of x(t)

iv) variance of x(t). **(08 Marks)**

b. Given a random variable Y with characteristic function $\phi(\omega) = \in[e^{i\omega Y}]$ and a random process defined by $x(t)t = \cos(\lambda t + y)$, show that $\{x(t)\}$ is stationary in wide sense if $\phi(1) = \phi(2) = 0$. **(05 Marks)**

c. A stationary random process $x = \{x(t)\}$ with mean 3 has auto–correlation function $R(\tau) = 16 + 9e^{-|\tau|}$. Find the standard deviation of the process. **(03 Marks)**

OR

6 a. Consider two random processes $x(t) = 3\cos(\omega t + \theta)$ and $Y(t) = 2\cos\left(\omega t + \theta = \frac{\pi}{2}\right)$ where θ is a random variable uniformly distributed in $(0, 2\pi)$. Prove that $\sqrt{R_{xx}(0)R_{yy}(0)} \geq |R_{xy}(\tau)|$. **(04 Marks)**

b. Let x(t) be a random process with constant mean μx. Show that x(t) is mean ergodic if :

$$\lim_{T \to \infty}\left[\frac{1}{4T^2}\int_{-T}^{T}\int_{-T}^{T} C_{xx}(t_1 t_2)\, dt_1\, dt_2\right] = 0.$$ **(06 Marks)**

c. A message transmission system is found to be Markovian with transition probability of current message to next message as given by matrix :

$$P = \begin{bmatrix} 0.2 & 0.3 & 0.5 \\ 0.1 & 0.2 & 0.7 \\ 0.6 & 0.3 & 0.1 \end{bmatrix}$$

The initial probabilities of state $P_1(0) = 0.4$, $P_2(0) = 0.3$, $P_3(0) = 0.3$. Find probabilities of the next message. **(06 Marks)**

Module-4

7 a. Define two types of errors in hypothesis testing with examples. What are one tailed and two tailed tests **(03 Marks)**

b. Experience has shown that 20% of manufactured product is of top quality. In one days production of 400 articles, only 50 are of top quality. Show that either production of day chosen was not a representative sample or hypothesis of 20% was wrong. Based on particular day's production also find 95% confidence units for percentage of top quality product. **(07 Marks)**

c. Two populations have same mean, but standard deviation of one is twice that of other. Show that in samples each of size 500, drawn under simple random conditions, difference of means will, in all probability, not exceed 0.3 times standard deviation. **(06 Marks)**

OR

8 a. The mean life time of a sample of 25 bulbs is found as 1550 hours with standard deviation of 120 hours. The company manufacturing bulbs claims that average life of their bulbs is 1600 hours. Is the claim acceptable at 5% claim? **(05 Marks)**

b. The nicotine contents in 2 random samples of tobacco are :

Sample 1 : 21 24 25 26 27

Sample 2 : 22 27 28 30 31 36

Can you say that two samples came from same population? **(05 Marks)**

c. Prove that the value X^2 for 2×2 contingency table

a	b
c	d

is given by $X^2 = \dfrac{N(ad - bc)^2}{(a+b)(c+d)(a+c)(b+d)}$ **(06 Marks)**

Module-5

9 a. Explain the basic characteristics of a queuing system. **(04 Marks)**

b. Customer arrive at a watch repair shop according to Poisson process at a rate of one per every 10 minutes and service time is exponential with mean 8 minutes. Find average number of customer spends in queue for service. **(06 Marks)**

c. Derive average number of customers in the queue and probability that there will be someone waiting for M|M|S (Model II) queuing model. **(06 Marks)**

OR

10 a. A petrol pump station has 4 pumps. The service time follows an exponential distribution with mean of 6 minutes and cars arrive for service in a Poisson process at rate of 30 cars per hour.

i) What is probability that an arrival will have to wait in line

ii) Find average waiting time in the queue, average time spent in the system and average number of cars

iii) For what percentage of time would pumps be idle? **(08 Marks)**

b. For M|M|S model, (model IV) derive average number of customers in the system, average waiting time of customer in the queue and average waiting time of a customer in the system. (consider buffer with finite capacity). **(08 Marks)**

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mTech II sem CS

CBCS SCHEME

USN | | | | | | | | | | |

16/17SCS23

Second Semester M.Tech. Degree Examination, Dec.2018/Jan.2019

Advanced Algorithm

Time: 3 hrs. Max. Marks: 80

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

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-1

1 a. Define and explain the various asymptotic notations with related graphs and examples. **(08 Marks)**

b. Define master method. Use master method to give tight asymptotic bounds for the following recurrence :

i) $T(n) = T(2n/3) + 1$

ii) $T(n) = 9T(n/3) + n$. **(08 Marks)**

OR

2 a. What is amortized analysis? What are the common techniques used in amortized analysis? Explain any two techniques with an example. **(08 Marks)**

b. Use a recursive tree to determine a good asymptotic upper bound on the recurrence.

$$T(n) = \begin{cases} c & \text{if } n = 1 \\ 2T(n/2) + cn & \text{if } n > 1 \end{cases}$$ **(08 Marks)**

Module-2

3 a. Using belloman-Ford algorithm, find the shortest path from the source vertex 'S' to the remaining vertices in the graph shown in Fig.Q3(a). **(08 Marks)**

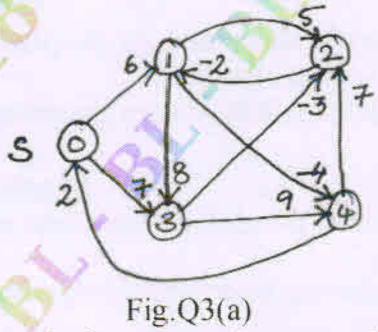

Fig.Q3(a)

b. Write an algorithm to compute single source shortest path for a DAG. Also apply the algorithm for the following graph taking source vertex as 'S'. **(08 Marks)**

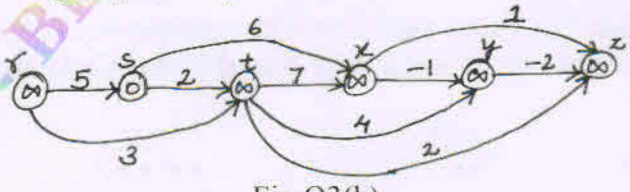

Fig.Q3(b)

OR

4 a. Write the Ford-Fulkerson algorithm and also find the maximum flow in the graph of Fig.Q4(a) from vertex 0 to vertex 5. **(08 Marks)**

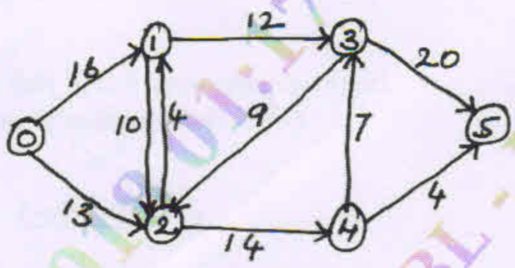

Fig.Q4(a)

b. Write and explain algorithm for recursive FFT, also determine its running time. **(08 Marks)**

Module-3

5 a. Write Chinese remainder theorem. **(08 Marks)**

b. Find all solutions to the equation $X \equiv 2 \pmod 5$ and $X \equiv 3 \pmod{13}$. **(08 Marks)**

OR

6 a. Give the pseudocode for computing GCD of two numbers using extended form of Euclid's algorithm. Also find GCD (99, 78) and show the computational steps at each level of recursion **(08 Marks)**

b. Explain coefficient and point value representations of a polynomial with example. **(08 Marks)**

Module-4

7 a. Write Boyer-Moore string matching algorithm. apply Boyer-Moore algorithm to search for the pattern B A O B A B in the text B E S S – K N E W – A B O U T – B A O B A B S. **(08 Marks)**

b. Construct the string matching automation for the pattern p = a b a b a c a and illustrate its operation on the text string : a b a b a b a c a b a. **(08 Marks)**

OR

8 a. Compute the prefix function π for the pattern a b a b c a in the alphabet $\Sigma = \{a, b\}$ for the Knuth-Morris – Pratt algorithm. **(08 Marks)**

b. Write and explain the Rabin-Karp algorithm for string matching. **(08 Marks)**

Module-5

9 a. Write an algorithm for testing polynomial equality using Monte – Carlo algorithm. **(08 Marks)**

b. Explain randomizing deterministic algorithm taking linear search algorithm as an example. **(08 Marks)**

OR

10 a. Explain Las Vegas algorithm with appropriate example. **(08 Marks)**

b. Write and explain linear false biased Monte Carlo algorithm for primality testing. **(08 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

16SCS41

Fourth Semester M.Tech. Degree Examination, Dec.2018/Jan.2019
Machine Learning Techniques

Time: 3 hrs. Max. Marks: 80

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

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-1

1 a. Define Machine Learning. Discuss the basic design issues of Machine Learning. **(06 Marks)**
b. Give Decision Tree to represent the Boolean function $[A \wedge B] \vee C$. **(10 Marks)**

OR

2 a. Define Version Space. Explain candidate elimination algorithm to find version space. **(06 Marks)**
b. Find the version space for the training examples given below using candidate elimination algorithm. **(10 Marks)**

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

Module-2

3 a. Define Percepson. Design a two input perceptron to implement $\neg a \wedge b$. **(06 Marks)**
b. Derive the Gradient – Descent rule and explain Gradient – Descent algorithm. **(10 Marks)**

OR

4 a. Explain BackPropagation Algorithm. **(08 Marks)**
b. Write the prototype of Genetic Algorithm. Illustrate with example. **(08 Marks)**

Module-3

5 a. Explain Genetic Operators, with illustration. **(08 Marks)**
b. Define the following with example :
i) Prior Probability ii) Posterior probability iii) Maximum a Posteriori (MAP) iv) Maximum Likelihood hypotheses. **(08 Marks)**

OR

6 a. Explain Bruit Force Bayes Learning Algorithm and prove the formula for posterior probability. **(08 Marks)**
b. Discuss Minimum Description Length (MDL) principle. **(08 Marks)**

Module-4

7 a. Explain PAC – learning with illustration. **(08 Marks)**
b. Write a note on Mistake bound model of learning. **(08 Marks)**

OR

8 a. Explain KNN Algorithm for approximating discrete valued function. **(08 Marks)**
b. Write a note on Locally Weighted Regression. **(08 Marks)**

Module-5

9 a. Explain Learn – One – Rule general to specific beam search algorithm. (08 Marks)
b. Give the Basic definitions / terminologies from first - order logic. (08 Marks)

OR

10 a. Give the remarks on Explanation based Learning. (08 Marks)
b. Explain Q – Learning Algorithm with illustration. (08 Marks)

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