DECEMBER-2019

EXAMINATION TIME TABLE

PROGRAMME - S.E. (Computer) (REV. -2012) (CBSGS)

SEMESTER - III

Days and Dates	Time	Paper Code	Paper
Thursday, November 14, 2019	**02:30 p.m. to 05:30 p.m.**	**49301**	**APPLIED MATHEMATICS-III**
Monday, November 18, 2019	**02:30 p.m. to 05:30 p.m.**	**49302**	**ELECTRONIC CIRCUITS AND COMMUNATION FUNDAMENTALS**
Wednesday, November 20, 2019	**02:30 p.m. to 05:30 p.m.**	**49303**	**DATA STRUCTURES**
Friday, November 22, 2019	**02:30 p.m. to 05:30 p.m.**	**49304**	**DIGITAL LOGIC DESIGN AND ANALYSIS**
Tuesday, November 26, 2019	**02:30 p.m. to 05:30 p.m.**	**49305**	**DISCRETE STRUCTURE**
Thursday, November 28, 2019	**02:30 p.m. to 05:30 p.m.**	**49306**	**OBJECT ORIENTAED PROGRAMMING METHODOLOGY**

Time Duration: 3Hr **Total Marks: 80**

N.B.:1) Question no.1 is compulsory.
2) Attempt any three questions from Q.2to Q.6.
3) Figures to the right indicate full marks.

Q1. a) Find the Laplace transform of $e^{-4t}t\sin 3t$. **[5]**

b) Find the half-range cosine series for $f(x) = x$, $0 < x < 2$. **[5]**

c) Find $\nabla.\left(r\,\nabla\frac{1}{r^3}\right)$. **[5]**

d) Show that the function $f(z) = \sin z$ is analytic and find $f'(z)$ in terms of z. **[5]**

Q2. a) Find the inverse Z-transform of $F(z) = \frac{1}{(z-5)^3}$, $|z| < 5$. **[6]**

b) Find the analytic function whose imaginary part is $e^{-x}(y\sin y + x\cos y)$. **[6]**

c) Obtain Fourier series for the function $f(x) = x + x^2$, $-\pi \le x \le \pi$ and $f(x + 2\pi) = f(x)$. **[8]**

Hence deduce that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots$ and $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$

Q3. a) Find $L^{-1}\left[\frac{1}{(s-a)(s-b)}\right]$ using convolution theorem. **[6]**

b) Is S= $\left\{\sin\left(\frac{\pi x}{4}\right), \sin\left(\frac{3\pi x}{4}\right), \sin\left(\frac{5\pi x}{4}\right), \ldots\ldots\right\}$ orthogonal in (0 , 1)? **[6]**

c) Using Green's theorem in the plane evaluate $\int_c (xy + y^2)dx + (x^2)dy$ where C is the closed curve of the region bounded by $y = x$ *and* $y = x^2$. **[8]**

Q4. a) Find Laplace transform of $f(t) = \begin{cases} \sin 2t & , o < t \le \frac{\pi}{2} \\ 0 & , \frac{\pi}{2} < t < \pi \end{cases}$ and $f(t) = f(t + \pi)$. **[6]**

b) Prove that a vector field $\bar{f}$ is irrotational and hence find its scalar potential $\bar{f} = (x^2 + xy^2)\,i + (y^2 + x^2y)j$. **[6]**

c) Find the Fourier expansion for $f(x) = \sqrt{1 - \cos x}$ in (0 , 2π). Hence deduce that $\frac{1}{2} = \sum_1^\infty \frac{1}{4n^2-1}$. **[8]**

Q5.a) Use Gauss's Divergence Theorem to show that $\iint_S \nabla\, r^2\overline{ds} = 6V$ where S is any closed surface enclosing a volume V. **[6]**

b) Find the Z-transform of $f(k) = b^k$, k< 0 . **[6]**

c) i) Find $L^{-1}\left[\frac{s}{(s-2)^6}\right]$. **[8]**

ii) Find $L^{-1}\left[\log\left(1 + \frac{a^2}{s^2}\right)\right]$.

Q6.a) Solve using Laplace transform **[6]**
$(D^2 + 9)y = 18t$, given that $y(0) = 0$ and $y\left(\frac{\pi}{2}\right) = 0$

b) Find the bilinear transformation which maps the points Z=∞, i, 0 onto W=0, i, ∞ . **[6]**

c) Find Fourier integral representation of $f(x) = e^{-|x|}$ $-\infty < x < \infty$. **[8]**

E4166FBCBC26C4F0D54936B96ACCBFD7

(3 Hours) **[Total Marks : 80]**

N.B. : 1. Question **One** is **Compulsory.**
2. Solve any **Three** out of remaining.
3. **Draw** neat and **clear** diagrams.
4. Assume suitable **data** if required

Q.1. Attempt the following

a) Draw and explain block diagram of op-amp 5
b) Compare BJT and FET 5
c) Justify that JFET can be used as voltage variable resistor 5
d) What are the drawbacks in Delta Modulation? How to overcome them? 5

Q.2. A. Explain Balanced modulator for DSB signal. 10

B. Explain block diagram of PLL. 10

Q.3. A. Explain op-amp as inverting and non-inverting Amplifier. 10

B. Write short note on generation of FM by Armstrong method. 10

Q.4. A. What is modulation index for AM and FM. An AM signal has a total power of 48 Watts with 45% modulation. Calculate the power in the carrier and the sidebands. 10

B. Explain Super-heterodyne receiver along with waveforms for each stage. 10

Q.5. A. What is multiplexing in Communication system? Explain TDM in detail. 10

B. Explain generation of PAM. 10

Q.6 . Write Short note (any two) 20
a) Zero Crossing Detector
b) Construction of n channel FET.
c) Characteristics of op-amp.

****

8B9F53D3223144C74BCE2CC990919C0F

/SE/Sem III / Comp. / CBSGS / 20-05-2019

Q.P. Code: 36285

[Time: Three Hours] [Marks:80]

N.B. (1) Question No.1 is Compulsory
(2) Attempt any three questions out of remaining five questions
(3) Make suitable assumptions wherever necessary
(4) Figures to the right indicate full marks

1. (a) Explain ADT with an example. (5)
(b) Differentiate between Static and Dynamic Data Structure (5)
(c) Write a 'C' program to implement Binary Search using recursion (5)
(d) Discuss practical applications of Queues (5)

2. (a) Write a 'C' program to implement STACK using arrays (10)
(b)What are the different methods of File I/O in 'C' language? What library functions are supported by 'C' language to do this? (10)

3. (a) What are the advantages of Linked list over array? Write a 'C' program to implement Queue ADT using Linked List (10)

(b)Explain indexed Sequential search with a suitable example. What are the advantages and disadvantages of Indexed Sequential search (10)

4. (a) Write a 'C program to create a "Singly Linked List" ADT. The ADT should support the following: (10)

(i) Creating a Linked List
(ii) Inserting a node after a specific node
(iii) Deleting a node
(iv) Displaying the list

(b)Explain the method of Huffman Encoding. Apply Huffman encoding method for the sentence "MAHARASHTRA". Give Huffman code for each symbol. (10)

5. (a) Write a 'C' program to create Binary Search Tree. Show BST for the following Input: 10,5,14,22,17,1,8 (10)

(b)What is the use of hashing? Show hash table entries for the given dataset using Linear Probing and Quadratic Probing: 12,45,67,88,27,78,20,62,36,55. (10)

6. Write Short notes on (any two) (20)
(a) Threaded Binary Tree
(b) Explain BFS algorithm with example
(c) Doubly Linked list.

****

Time: 3 Hours **Total Marks: 80**

N.B. (1) Question No. 1 is compulsory
(2)Assume suitable data if necessary
(3)Attempt any three questions from remaining questions

1 Attempt any 5

(a) Convert $(216.24)_{10}$ into octal, binary and hexadecimal, and base 4. (4)
(b) perform $(76)_{10} - (33)_{10}$ in BCD using 10's complement method (4)
(c) Explain Glitch problem. (4)
(d) State De Morgan's theorem. Prove NAND is Universal gate. (4)
(e) Encode the data bits 110010001 using Hamming code. (4)
(f) Explain SOP and POS and solve the following using K-Map
$F(A,B,C,D)=\sum m(1,5,6,7,10,11,13)+d(2,4)$ (4)
(g) Explain parity generator/checker. (4)

2 (a) Reduce equation in SOP form using Quine McCluskey method and realize circuit using basic gates. $F(A,B,C,D) = \pi M\ (2,7,8,9,10,12)$ (10)
(b) Explain and Design a BCD adder using 4 bit binary adders. (10)

3 (a) Implement 16:1 Mux using 8:1 Mux. (5)
(b) Explain lockout condition. How can it be avoided. (5)
(c) Design a 2 bit magnitude comparator. (10)

4 (a)Explain with neat diagram 2 input TTL NAND gate in detail. (10)
(b) Explain 4 bit bidirectional shift register. (10)

5 (a) Design mod 10 asynchronous counter using T flipflop (10)
(b) Convert SR flipflop to JK flipflop and T flipflop. (10)

6 Write short note on (any two):- (20)
(a) 3 bit Up/Down Asynchronous Counter
(b) 4-bit Universal shift register
(c) VHDL

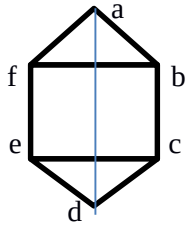
163A4613477425A40D6893384417399A

(3 Hours) **[Total marks: 80]**

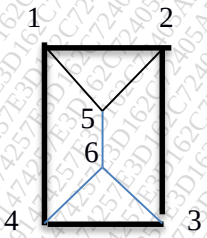
N.B (1) Question No. 1 is compulsory.
(2) Solve any three questions out of remaining five questions.
(3) Assumptions made should be clearly stated.
(4) Figures to the right indicate full marks.

Q.1 (a) For all sets A,X and Y show that [6M]
$A \times (X \cap Y) = (A \times X) \cap (A \times Y)$

(b) Define isomorphic graphs. Determine whether the following graphs are isomorphic or not. Justify your answer. [6M]



Fig(a)



Fig(b)

(c) Functions f ,g, h are defined on a set, [8M]

X={ 1,2,3} as
f = {(1, 2) ,(2,3) (3,1) }
g = {(1, 2), (2,1) (3,3) }
h = {(1, 1) ,(2,2) (3,1) }

(i) Find f o g , g o f, Are they equal ?
(ii) Find f o g o h and f o h o g

Q.2 (a) How many integers between 1 and 1000 are
i) not divisible by 3, nor by 5,nor by 7?
ii) not divisible by 5 and 7 but divisible by 3? [6M]

(b) State pigeonhole principle and extended pigeonhole principle. What is the minimum number of students required in a discrete structures class to be sure that at least six will receive the same grade, if there are five possible grades A, B, C ,D and E. [6M]

(c) Solve $a_{r+2} - a_{r+1} - 6a_r = 4$ [8M]

Q.3 (a) Prove by mathematical induction. [6M]

$1 + a + a^2 + \ldots\ldots\ldots + a^n = \frac{1 - a^{n+1}}{1-a}$, where $n \geq 0$

(b) If (G, *) is an Abelian group, then for all a, b ∈ G show that $(a * b)^n = a^n * b^n$ [6M]

(c) Let $a_r = 3^r, r \geq 0$ and [8M]
$b_r = 3^r, r \geq 0$ Find c_r that is $a_r * b_r$

C72405A5B375DC311891474257E3D162

Q.4 (a) Show that, $(\sim P \wedge (\sim Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \leftrightarrow R$ [6M]

(b) Define Hamitonian circuit and Hamitonian path. Determine which of the following graph contain an Eulerian or Hamitonian circuit.If it does, find such circuit. [6M]

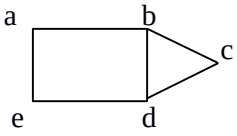


Fig (a)

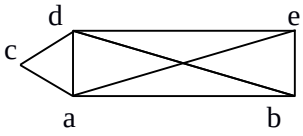


Fig (b)

(c) For each of the following sets of weights construct an optimal binary prefix code. For each weight in the set give the corresponding code word: [8M]

(1) 1,2,4,5,6,9,10,12
(2) 10,11,14,16,18,21

Q.5 (a)Define (i) Bounded Lattice (ii)Distributive Lattice (iii) Complemented Lattice [6M]

(b) Define planar graph. Determine the number of regions defined by a connected planar graph with 6 vertices and 10 edges. [6M]

(c) Consider (3,7) encoding function e: $B^3 \rightarrow B^7$ defined by [8M]

e (000)=0000000 e(100)=1000101
e (001)=0010110 e(101)=1010011
e (010)=0101000 e(110)=1101101
e (011)=0111110 e(111)=1111011

is a group code. How many errors it can detect?

Q.6 (a) Determine whether the given relation R is an equivalence relation.
R = {(6,6),(4,4),(3,3),(4,6),(6,4)(3,6)(6,3)(4,3)(3,4)} [6M]

(b) Determine whether the set together with the binary operation * is a semigroup ,monoid or a group .Justify your answer. [6M]

(i) Set of real numbers with a*b = a+b+2
(ii) The set of m × n matrices under the operation of multiplication.

(c) Give Prim's algorithm for minimum spanning tree. Use the same to find a minimum tree for graph shown in the following figure. [8M]

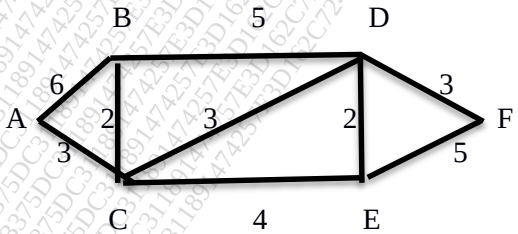


Fig (a)

C72405A5B375DC311891474257E3D162

Q. P. Code : 26235

(3 Hours) **Total Marks : 80**

Note: Q. 1 is **compulsory**.

Attempt any **THREE** questions from **Q. 2 to Q. 6**

Q. 1 **a** Explain Applet life cycle methods. **[5]**

b Write a program to display Fibonacci series up to first n terms. Take input from command line arguments. **[5]**

c Explain Wrapper class in JAVA. **[5]**

d Explain System.arraycopy() method with example. **[5]**

Q. 2 **a** Explain the steps to create package in JAVA to add class and interface with example. **[10]**

b Differentiate between method overloading and overriding. Write a program to override **volume()** method of **Shape** class into its subclasses **Cube** and **Cylinder. Shape** is an abstract class. **[10]**

Q. 3 **a** Explain different types of relationships among the entities. **[10]**

Define the relationships among the objects of given sentences:

1) Teacher is an Employee.
2) Teacher teaches OOPM subject to students.
3) John hires a car.
4) Drawer is a part of table.

b Explain different ways to create Thread in JAVA. Write a program to display following pattern using threads. **[10]**

$@$@$@$@$@$@$@$@$@

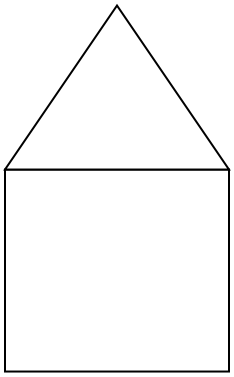
Q. 4 **a** Explain bitwise operators in JAVA. **[5]**

b Discuss **static** data members and methods in JAVA. **[5]**

c Explain any two methods of **String** class. **[5]**

6AF53323CCA72AA1656134B5FACEE49F

d Write an applet program to display **[5]**



Q. 5 **a** Explain exception handling mechanism with the help of **try**, **catch**, **throw**, **throws** and **finally**. **[7]**

b The manufacturing industry wants to maintain record of its products. If any new product is build then it is added to the list. Also if any product is scraped it can be deleted from the list. Write a program to perform above operations and display list of products. **[8]**

c Write a program to check whether given string is palindrome or not. **[5]**

Q. 6 **a** Explain inheritance and its types in JAVA. **[10]**

b Write a program to display sum of column elements of a matrix. **[10]**

****

6AF53323CCA72AA1656134B5FACEE49F