(60)   SE-sem-III - CBSGS- Comps - A M III   23/11/17

[Time: Three Hours]   [Marks:80]

Please check whether you have got the right question paper.

N.B: 1. Question.No.1 is compulsory.
        2. Attempt any three from the remaining six questions.
        3. Figures to the right indicate full marks.

Q.1   a) If the Laplace transform of $\sin^2 3t$ 20
       b) Prove that $f(z) = \log z$ is analytic
       c) Obtain Fourier series for $f(x) = x^2$ in (-2,2)
       d) Find the Z-Transform of $\cos 2k, k \geq 0$

Q.2   a) Prove that $\bar{F} = 2xyz^3 i + x^2 z^3 j + 3x^2 yz^2 k$ is irrotational.   06
          Find Scalar potential for $\bar{F}$

       b) Find the inverse Laplace Transform using Convolution theorem   06
          $$\frac{1}{(s^2+6s+18)^2}$$

       c) Find Fourier Series of $f(x) = \frac{\pi-x}{2}$ in $(0,2\pi)$.   08

          Hence deduce that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} + - - - - - -$.

Q.3   a) Find the Analytic function $f(z) = u + iv$ if $u + v = \cos x \cosh y - \sin x \sinh y$ 06

       b) Find Inverse Z transform of $\frac{2z^2-10z+13}{(z-3)^2(z-2)}$, $2 < |z| < 3$ 06

       c) Solve the Differential Equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dx} y = 3te^{-1}$, $y(0) = 4$, $y'(0) = 2$ using   08
          Laplace Transform

Q.4   a) Find the Orthogonal Trajectory of $x^2 + y^2 - 3xy + 2y = c$ 06

       b) Using Greens theorem evaluate $\int_c (x^2 - y)dx + (2y^2 + x)dy, C$ is closed path formed   06

          by $y = 4, y = x^2$

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08

c) Express the function $f(x) = \begin{cases} \sin x\ ; 0 < X \leq \pi \\ 0 \quad\ ; X > \pi \end{cases}$ as Fourier Integral. Hence evaluate $\int_0^\infty \frac{\cos(\lambda\pi/2)}{1-\lambda^2}\, d\lambda$

06

Q.5   a) Find Inverse Laplace Transform of $\frac{2s^2-6s+5}{s^3-6s^2+11s-6}$

06

b) Find the Bilinear Transformation that maps the points $z = 1, i, -1\ into\ w = i, 0, -i$

08

c) Evaluate using Stoke's theorem $\int_c \bar{F} \cdot \overline{dr}$ where c is the boundary of the circle $x^2 + y^2 + z^2 = 1, z = 0$ and $\bar{F} = yzi + zxj + xyk$

06

Q.6   a) Find the Directional derivative of $\emptyset = x^2 + y^2 + z^2$ in the direction of the line $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$ $at\ (1,2,3)$

06

b) Find complex form of Fourier series for $e^{ax}; (-\pi, \pi)$

08

c) Find Half Range sine Series for $f(x) = x(2-x)$ $\quad 0 < x < 2$ hence deduce that $\sum \left(\frac{1}{n^2}\right) = \frac{\pi^6}{945}$

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Page 2 of 2

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Q.3 (c) Solve the differential equation $\dfrac{d^2y}{dt^2} + 2\dfrac{dy}{dt} + y = 3te^{-t}$

Q.6 (c) deduce that $\sum \dfrac{1}{n^6} = \dfrac{\pi^6}{945}$

University of Mumbai

Correction in Program Code : T1723A - S.E.(INFORMATION TECHNOLOGY)(SEM III) (Rev-2012)(CBSGS) / T1495 - APPLIED MATHEMATICS -III **Q.P code :23178**
AND
Program code -T1123 - S.E./COMPUTER ENGG)(SEM III) (REV-2012) (CBSGS) / T1495 - APPLIED MATHEMATICS-III **Q.P code :23178**

Read as:

Q.1 a) **find** the Laplace transform of

9F-sem-III - 03568- Computers—OOPM

26/12/

T1123 / T1500   OBJECT ORIENTAED PROGRAMMING METHODOLOGY

Q .P. Code : 26234

(3 Hours)   Total Marks : 80

N.B   1) Question **no. 1 is compulsory.**

2) Attempt **any three from remaining** questions.

Q. 1   a   What role does "interface" play in multiple inheritance. Explain with example.   [10]
Demonstrate use of interface to achieve polymorphism with example.

b   Differentiate between abstract class and interface   [5]

c   Create a method size(Object z), that accepts a single refernce argument, z. If z   [5]
refers to "Rectangle" then size(z) returns its area, and if z is a refernce to a
"Cube" then size(z) returns its volume. If z refers to an object of any other class,
then size(z) returns -1.
(Hint: Use instanceof operator)

Q. 2   a   Explain different types of relationships among entities.   [10]
Define the relationships among the objects of given sentences:
1)   Employee works on project.
2)   Customer places order.
3)   WebOrder, TelephoneOrder is a kind of order.

b   What is the advantage of clause "finally"   [10]
List any 2 exceptions defined in Java. Explain use of try, catch and use of multiple
catch block .

Q. 3   a   Create class Student (roll number, name).   [10]
Class Test (mark1, mark2) inherit student class.
Create interface Sport with data member as sports_mark and method
set_sportMark().
Create class Result which extends Test and implements Sport and has a method
named calculate which finds total as (total=marks1+marks2+sports_mark) and
method which display all the details .
Create an object of Result class and show result.

T1123 / T1500   OBJECT ORIENTAED PROGRAMMING METHODOLOGY

Q .P. Code : 26234

b   What is a class? How does it accomplish data hiding? What is the need of a   **[10]**
constructor?

Q. 4   a   Explain access specifiers in JAVA. Can all methods of a class be private?   **[10]**

b   Which are the two different ways to create a thread? Write a multithreaded   **[5]**
program to show inter-leaving of actions from 2 threads and display
ABABABABABABAB

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

Q. 5   a   Explain different features of JAVA.   **[10]**

b   Write a program to perform following operations on vector   **[10]**
1.   To add city name to vector
2.   To remove city name from vector
3.   To display all city name

Q. 6   a   Write a program to create a Package College with class Student and Marks   **[10]**
Create class Student with data member as roll_num and Name. Accept the value
from theuser in getdata() and display it in putdata()
Create class Marks that inherits Student with data member as marks (It is array
accepting marks for 5 different subject). Accept the Marks in getdata() ,
Calculate the sum of marks display result of student in putdata() based on
percentage (if > =90 display Merit if >=75 and <90 Distinction if >= 60 and <75
First class)
Create class Demo with Main function, create the object of the appropriate class
and display the result for 2 different students.

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

c   Differentiate between Array and Vector.   **[5]**

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(10)

SE :- Computer (CBGS) Sem-III DS 07/12/201

QP CODE : 24787

(3 Hours) Marks : 80

NB : (1) Question **No.1** is **Compulsory.**
(2) Attempt **any three** questions of the remaining **five** questions.
(3) Figures to the right indicate full marks.
(4) Make suitable assumptions wherever necessary with proper justification.

1. (a) Explain linear and non-linear data structures with suitable example. 5
   (b) Differentiate singly linked list and doubly linked list. 5
   (c) Write ADT for Queue. Also give applications for queue. 5
   (d) What is recursion ? Write a recursive function to calculate sum of n natural numbers. 5

2. (a) What are the various searching techniques ? Write a program to implement binary 10
      search.

   (b) What is Huffman coding ? Find the Huffman code for each character in the 10
       sentence 'DATA STRUCTURE'.

3. (a) Write a program to implement Singly Linked List that performs following functions : 10
       (i) Insert a node in the beginning
       (ii) Delete a specified node
       (iii) Count the number of nodes
       (iv) Search for a specific value
       (v) Displaying the list

   (b) Explain different graph traversal techniques with suitable example. 10

4. (a) What is hashing ? Store the following dataset using linear probing and quadratic 10
       probing in a table of size 11.
       25, 5, 10, 11, 22, 33, 40, 50, 30, 51, 31.

   (b) Write a program to convert infix expression to postfix expression using stack. 10

5. (a) Construct B-tree of order 5 for the following dataset : 10
       50, 25, 10, 5, 7, 3, 30, 20, 8, 15 .

   (b) What is a circular queue ? Write a program to implement circular queue. 10

6. Write a short notes on (any two) 20
   (i) AVL Trees
   (ii) Threaded binary trees
   (iii) Memory represention of graphs
   (iv) Radix sort
   (v) Sparse Matrix

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SE-Sem II- CBSGS- Computers- DLDA 3/12/1

(16)

Q.P. Code: 24867

(3 Hours) [Max. Marks 80]

N.B
(1) Question no. 1 is compulsory.
(2) Attempt any 3 from the remaining questions.
(3) Assume suitable data if necessary.
(4) Figures to right indicate full marks.

Q 1 (a)	Prove using Boolean algebra: "NAND gate is Universal gate"	05
Q 1 (b)	A 7-bit even parity hamming code is received as 1000010. Correct it for any errors and extract 4 bit data	05
Q 1(c)	Simplify $F(P,Q,R,S) = \pi M(3,4,5,6,7,10,11,15)$ using kmap and implement using minimum number of gates.	05
Q 1(d)	Explain Johnson Ring Counter	05
Q 2(a)	Reduce equation using Quine McCluskey method and realize circuit using basic gates– $F(A,B,C,D) = \sum m(1,5,6,12,13,14) + d(2,4)$	10
Q 2(b)	Compare TTL and CMOS wrt to gate, voltage level, fan in fan out, propagation delay	10
Q 3 (a)	What is race around condition? How to overcome it?	10
Q 3 (b)	Implement full subtractor using basic gates	10
Q 4(a)	Design a 32:1 multiplexer using 4:1 multiplexer with suitable diagrams and tables	10
Q 4 (b)	Explain 3 bit asynchronous down counter with timing diagram and truth table	10
Q 5(a)	Explain the working of 4-bit parallel adder. Identify its disadvantage how to overcome it?	10
Q 5(b)	Convert SR flipflop to D flipflop.	10
Q 6	Write short note on (any 4)	20

1) VHDL
2) 4 bit magnitude Comparator
3) Pseudo random number generator
4) Universal Shift Register
5) ALU

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(15) SE-sem-III - CBSGS - Computer - DIS   19/12/12

Duration: 3hrs   [Total Marks: 80]

1) Question **no.1** is **compulsory**.
2) Solve any **three** questions out of remaining **five** questions.
3) All questions carry equal marks as indicated by figures to the right.
4) Assume appropriate data whenever required. State all assumptions clearly.

Q.1 a) Prove by induction that n^2+n is an even number, for every natural number n.   (05M)

b) Find the generating function for the following finite sequences   (05M)

   i) 2,2,2,2,2,2   ii) 1,1,1,1,1,1

c) Let A={a,b,c,d,e} and R={(a,a),(a,b),(b,c),(c,e),(c,d),(d,e)}   (05M)

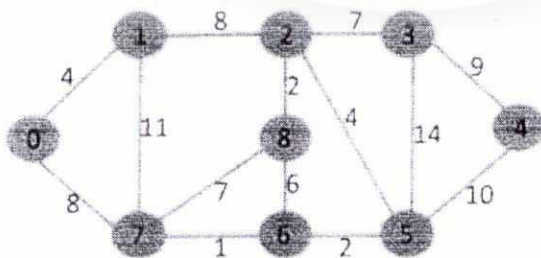   Compute R^2 and R^∞

d) Define Lattice. Check if the following diagram is a lattice or not.   (05M)

Q.2 a) Define Isomorphism of graphs. Find if the following two graphs are isomorphic. If yes, find the
one-to-one correspondence between the vertices. If not justify your answer.   (08M)

b) Find Minimum spanning tree for the following graph using Kruskal's Algorithm.   (08M)

c) Prove $(p \vee q) \wedge (p \wedge \neg q) \vee q] \leftrightarrow p \vee q$

Page **1** of **3**

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Q.P. Code: 24629

Q. 3 a) Prove that set G = {0,1,2,3,4,5} is a finite abelian group of order 6 with respect to addition modulo 6.
(08M)

b) Let A={1,2,3,4}, let R={(1,2),(2,3),(3,4),(2,1)} Find Transitive closure of R using Warshall's Algorithm.
(08M)

c) Test whether the following function is one-to-one, onto or both.
(04M)

f: Z→Z, $f(x)=x^2+x+1$

Q.4 a) Show that the (2,6) encoding function e:B^2→B^5 defined by
(08M)

e(00)=000000   e(01)=011110

e(10)=101010   e(11)=111000 is a group code.

Find Minimum distance.How many errors will it detect and correct?

b) Let H = $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Be a parity check matrix. Decode the following words relative to a maximum likelihood decoding function associated with e_H. 1) 01111 2)01110 3)11001
(08M)

c) How many friends must you have to guarantee that at least five of them will have birthdays in the same month?
(04M)

Q.5 a) Let G be a set of rational numbers other than 1. Let * be an operation on G defined by a*b=a+b-ab for all a,b €G. Prove that (G,*) is a group.

b) Solve the recurrence relation $a_r-a_{r-1}-6a_{r-2}=-30$ given $a_0=20$, $a_1=-5$
(08M)

c) Let A={a,b,c,d,e,f,g,h}. Consider the following subsets of A
(04M)
A1={a,b,c,d}   A2={a,c,e,g,h}
A3={a,c,e,g}   A4={b,d}   A5={f,h}
Determine whether following is partition of A or not. Justify your answer.
i) {A1, A2} ii) {A3, A4, A5}

Q.6 a) Draw the Hasse Diagram of the following sets under the partial order relation divides and indicate which are chains. Justify your answers.
(08M)
I.   A={2,4,,12,24}
II.   A={1,3,5,15,30}

b) Let the functions f,g, and h defined as follows:
(08M)
f:R→R, f(x)=2x+3
g: R→R, g(x)=3x+4
h: R→R, h(x)=4x
Find gof, fog, foh, , gofoh

Page 2 of 3

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c) Determine Euler Cycle and path in graph shown below   (04M)
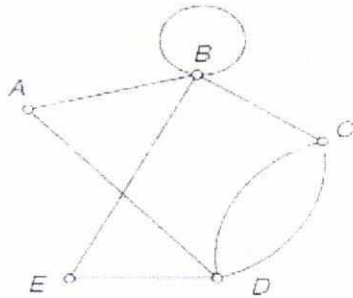
QP Code 24629

There is a correction in QP Code 00024629 for SE(Comp) Sem III
Discrete structures . It is B^6 instead of B^5

Q.4 a) Show that the (2,6) encoding function $e:B^2 \rightarrow B^6$ defined
by

$$e(00)=000000 \qquad e(01)=011110$$
$$e(10)=101010 \qquad e(11)=111000 \text{ is a group code.}$$

(32)   SE-sem-III-CBSGS-computers- ECCF   29/11/17

Time:-3 Hrs   Marks: 80

N.B. : 1. Question **ONE** is **compulsory**

2. Solve any **THREE** out of remaining questions

3. Draw neat and clean diagrams

4. Assume suitable data if required.

Q. 1.   A. Justify that JFET can be used as a Voltage Variable Resistor.   5

B. Explain the ideal characteristics of op-amp   5

C. With neat circuit diagram explain the use of PLL in frequency demodulation.   5

D. Explain detection of pulse code modulation.   5

Q. 2   A. Explain various biasing techniques used in case of JFET.   10

B. Explain how op-amp can be used as differentiator.   10

Q. 3   A. Explain the concept of virtual ground in operational amplifier.   5

B. State and explain Barkhausens criteria for oscillations.   5

C. Explain any one pulse modulation technique of your choice.   5

D. Determine the magnitude of g_m for a JFET with I_{DSS} = 6 mA and V_P= −3 V at

V_{GS}= −0.5 V and also at V_{GS}= −1.5 V.   5

Q. 4   A. Explain the generation of DSBSC using balanced modulator.   10

B. With neat diagram and waveforms explain the operating principle of PLL. 10

Q. 5   A. With block diagram describe the principle of analog communication system.   10

B. Explain phase modulation in detail.   10

Q. 6   A. What is Nyquist Criteria? What is its significance?   5

B. Discuss Class C power amplifier.   5

C. Write short note on generation of FM by Armstrong method   5

D. Mention important specifications of ADC and DAC required for communication.   5

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