

(3 Hours)

[Total Marks : 80]

- NB:** 1) Question No. 1 is compulsory.  
 2) Attempt any three of the remaining.  
 3) Figures to the right indicate full marks.

1. a) Find the Laplace transform of  $te^{3t} \sin 4t$ . 05  
 b) Find half-range cosine series for  $f(x) = e^x$ ,  $0 < x < 1$ . 05  
 c) Is  $f(z) = \frac{z}{z}$  analytic? 05  
 d) Prove that  $\nabla \times (\bar{a} \nabla \log r) = 2 \frac{(\bar{a} \cdot \bar{r}) \bar{r}}{r^4}$ , where  $\bar{a}$  is a constant vector. 05
2. a) Find the Z-transform of  $\frac{1}{(z-5)^3}$  if  $|z| < 5$ . 06  
 b) If  $V = 3x^2y + 6xy - y^3$ , show that  $V$  is harmonic & find the corresponding analytic function. 06  
 c) Obtain Fourier series for the function 08  

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi}, & 0 \leq x \leq \pi \end{cases}$$
  
 hence deduce that  $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$
3. a) Find  $L^{-1} \left[ \frac{(s+2)^2}{(s^2+4s+8)^2} \right]$  using convolution theorem. 06  
 b) Show that the set of functions 06  
 $1, \sin \left( \frac{\pi x}{L} \right), \cos \left( \frac{\pi x}{L} \right), \sin \left( \frac{2\pi x}{L} \right), \cos \left( \frac{2\pi x}{L} \right), \dots$   
 Form an orthogonal set in  $(-L, L)$  and construct an orthonormal set.  
 c) Verify Green's theorem for  $\int_C (e^{2x} - xy^2) dx + (ye^x + y^2) dy$  08  
 Where  $C$  is the closed curve bounded by  $y^2 = x$  &  $x^2 = y$ .
4. a) Find Laplace transform of  $f(x) = K \frac{t}{T}$  for  $0 < t < T$  &  $f(t) = f(t+T)$ . 06  
 b) Show that the vector,  $\bar{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$  is irrotational and hence, find  $\phi$  such that  $\bar{F} = \nabla \phi$ . 06  
 c) Find Fourier series for  $f(x)$  in  $(0, 2\pi)$ , 08  

$$f(x) = \begin{cases} x, & 0 \leq x \leq \pi \\ 2\pi - x, & \pi \leq x \leq 2\pi \end{cases}$$
  
 hence deduce that  
 $\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$
5. a) Use Gauss's Divergence theorem to evaluate 06  
 $\iiint_V \nabla \cdot \bar{F} ds$  where  $\bar{F} = 2xi + xyj + zk$  over the region bounded by the cylinder  $x^2 + y^2 = 4$ ,  $z = 0$ ,  $z = 6$ .  
 b) Find inverse Z - transform of  $f(x) = \frac{z}{(z-1)(z-2)}$ ,  $|z| > 2$  06

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- c) (i) Find  $L^{-1} \left[ \log \left( \frac{s+1}{s-1} \right) \right]$  08  
(ii) Find  $L^{-1} \left[ \frac{s+2}{s^2-4s+13} \right]$
6. a) Solve  $(D^2+3D+2)y = 2(t^2+t+1)$  with  $y(0) = 2$  &  $y'(0) = 0$ . 06  
b) Find the bilinear transformation which maps the points  $0, i, -2i$  of  $z$ -plane onto the points  $-4i, \infty, 0$  respectively of  $w$ -plane. Also obtain fixed points of the transformation. 06  
c) Find Fourier sine integral of 08  
$$f(x) = \begin{cases} x, & 0 < x < 1 \\ 2-x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$$

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Course: S.E. (SEM - III) (REV.-2012) (CBSGS) (COMPUTER ENGG.) COMMON WITH (INFORMATION TECHNOLOGY)(Prog T1123 CW 1723A)

QP Code: 540701

· Correction:

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Q. 2(a)

Read As:

Find the **inverse** Z-transform of.....

Instead of :

Find the Z-transform of.....

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Query Update time: 25/11/2016 03:46 PM



Course: S.E. (SEM - III) (REV.-2012) (CBSGS) (COMPUTER ENGG.) COMMON WITH (INFORMATION TECHNOLOGY)(Prog T1123 CW 1723A)

QP Code: 540701

Correction:

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Q. 4(a)

Read As

Find laplace transform of  $f(t)=$

Instead of:

Find laplace transform of  $f(x)=$

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Query Update time: 25/11/2016 04:31 PM



**Q.P. Code: 552301**

**(3 Hours)**

**[ Total Marks : 80**

- N.B. :** (1) Question No.1 is Compulsory.  
(2) Answer **any three** out of remaining questions.  
(3) Assume suitable data if necessary.  
(4) **Figures to the right** indicate full marks.

1. (a) Define Algorithm and write its properties. 3  
(b) Write properties of B-Tree. 3  
(c) Define minimum spanning trees with examples. 3  
(d) What is Queue ADT ? Mention its operations. 3  
(e) What is linked list ? Explain types of linked list. 3  
(f) Define Recursion ? State its advantages and disadvantages. 3  
(g) Explain linear and non-linear data structures. 2
  
2. (a) Write a program to implement queue using arrays. 10  
(b) Write an algorithm for insertion and traversal in a circular linked list. 10
  
3. (a) Write a program to convert INFIX expression into POSTFIX expression. 10  
(b) Write an algorithm to implement Heap-sort. Also comment on its complexity. 10
  
4. (a) Define AVL Tree ? Construct AVL Tree for the following data (Mention type of rotation for each case) 10  
10,40,30,20,70,50,45.  
(b) Write a program to implement Priority Queue. 10

5. (a) Explain BFS and DFS algorithm with examples. **10**
- (b) What is Binary Search-Tree ? Construct the Binary Search Tree for the following set of data : **10**  
14, 10, 1, 20, 17, 24, 18, 12, 15, 11, 4, 6 .
6. Write short notes on **any four** of the following:- **20**
- (1) Red-black Trees
  - (2) Searching Algorithms
  - (3) Adjacency list and Adjacency matrix
  - (4) Euclid's Algorithm
  - (5) Expression Trees
  - (6) Asymptotic Notations.
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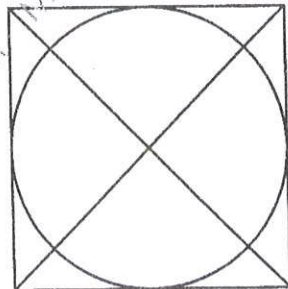
QP CODE : 541201

Time : 3 Hours

Max. Marks : 80

**Note: Q. 1 is compulsory.**Attempt any **THREE** questions from **Q. 2 to Q. 6**

- Q. 1**
- a Explain Java Virtual Machine. [5]
  - b Write a program to display factorial of given number. Take input from command line arguments. [5]
  - c Explain System.arraycopy() method with example. [5]
  - d Explain Thread life cycle. [5]
- Q. 2**
- a Explain different ways to create Thread in JAVA with example. [10]
  - b Differentiate between method overloading and overriding. Write a program to override **area()** method of **Shape** class into its subclasses **Rectangle** and **Square**. **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) Manager is an Employee.
    - 2) Teacher teaches OOPM subject to students.
    - 3) Merry owns a car.
    - 4) Engine is a part of car.
  - b Explain the steps to create package in JAVA to add class and interface with example. [10]
- Q. 4**
- a Explain bitwise operators in JAVA. [4]
  - b Explain use of **final** keyword when it is prefix with variable, method and class. [4]
  - c Explain Cohesion and Coupling. [4]
  - d Write an applet program to display [4]



- e What is abstract class? Explain with example. [4]

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- Q. 5 a Explain exception handling mechanism with the help of **try, catch, throw, throws** and **finally**. [7]
- b Department of Computer Engineering wants to maintain record of books. If any new book is purchased then it is added to the list. Also if any book is damaged or misplaced it can be deleted from the list. Write a program to perform above operations and display list of books available in the department. [8]
- c Differentiate between String and StringBuffer class. [5]
- Q. 6 a Explain inheritance and its types in JAVA. [5]
- b Explain wrapper class. [5]
- c Write a program to display sum of main diagonal elements of a matrix. [5]
- d Explain Applet lifecycle methods. [5]

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QP Code :552400

(3 Hours)

[Total Marks:80]

- N.B.: (1) Question No. 1 is compulsory.  
 (2) Solve any three questions out of remaining five.  
 (3) Figures to right indicate full marks.  
 (4) Assume suitable data where necessary.

1. Attempt any five out of six questions (20)
  - a) What are the various regions that a transistor can operate? In which region can a transistor be operated if it is used as a switch?
  - b) Give some applications of OpAmp and explain the block diagram of Op Amp.
  - c) Explain the working of LCD.
  - d) Minimize the following boolean expression using K-map  

$$F(A,B,C,D) = \sum m(0,3,7,11,15) + d(1,2,5)$$
  - e) Draw the truth table and excitation table for S-R flip flop.
  - f) Convert  $(101101.1101)_2$  to decimal, octal and hexa decimal.
2. a) What is the need for biasing? Explain voltage divider bias and locate the Q points (10)  
 b) Draw the truth table for full adder and realize using 3:8 decoder (10)
3. a) Explain the working of Monostable Multivibrator using IC555. Draw the waveforms and give its applications (10)  
 b) Design and implement one digit BCD adder using IC- 7483. (10)
4. a) Design and implement binary to gray code converter (10)  
 b) Realize the following expression using only one 8:1 MUX and few logic gates (05)  

$$F(A,B,C,D) = \sum m(0,3,6,8,11,13,15)$$
- c) Explain the practical differentiator circuit using op-Amp. (05)
5. a) Explain differential amplifier and elaborate on any one method to improve the CMRR (10)  
 b) Design a half adder using VHDL (05)  
 c) Design mod-3 up counter using JK Flip Flop (05)
6. Write short notes on any four (20)
  - a) Bidirectional shift registers
  - b) Full subtractor
  - c) Basic Logic Gates
  - d) BCD and Excess-3 code
  - e) JFET



Q. P. Code : 552502

(Time: 3 Hrs)

Marks: 80

N.B. : 1. Question no. 1 is compulsory.  
2. Solve any Three questions out of remaining Five questions.

- Qu-1 a) Explain generalization and specialization. 5  
b) Describe ACID Properties. 5  
c) Explain Total participation and Partial participation with example. 5  
d) Explain aggregate functions with example. 5
- Qu-2 a) Explain Shadow Paging. 10  
b) Explain different integrity constraints. 10
- Qu-3 a) Draw an E-R diagram for University database consisting of four entities: Student, Department, Class, Faculty. Student has unique id, student can enroll for multiple classes and has at most one major. Faculty must belong to department and faculty can teach multiple classes. Each class is taught by only one faculty. Every student will get grade for the class he/she enrolled. 10  
b) Explain conflict and View Serializability with example. 10
- Qu-4 a) Describe BCNF and 4NF in detail. 10  
b) Explain any 2 concurrency protocols in database systems. 10
- Qu-5 a) Explain any four relational algebra operators with example. 10  
b) Explain cost based query optimization. 10
- Qu-6 a) Explain deadlock with wait-for-graph. 10  
b) What is system catalog and meta data? 10

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Sem-III

2/12/2016

I.T (CBCS)

61

PADG

Q.P. Code : 552200

(3 Hours)

[ Total Marks : 80]

- Note: 1) Question No.1 is compulsory.  
2) Out of remaining attempt any three.  
3) Assume & mention suitable data wherever required.  
4) Figures to right indicates full marks.

1. Attempt any four from the following. 20
- (a) An amplifier has a bandwidth of 4 MHz with 10 K as the input resistor. Calculate the rms noise voltage at the input to this amplifier, if the room temperature is 25°C.
- (b) Explain Eye pattern with neat diagram.
- (c) Explain Quantization.
- (d) State and prove the differentiation in time domain property of the Fourier Transform.
- (e) What is diagonal clipping and explain how it can be avoided.
2. a) The AM Transmitter develops an unmodulated power o/p of 400 Watts across a 50 ohms resistive load. The carrier is modulated by a sinusoidal signal with a modulation index of 0.8. Assuming  $f_m = 5\text{KHz}$  and  $f_c = 1\text{MHz}$ . 10
- (i) Obtain the value of carrier amplitude  $V_c$  and hence write the expression for AM signal.
- (ii) Find the total sideband power.
- (iii) Draw the AM wave for the given modulation index.
- (b) Explain any one generation method of SSBSC AM. 10
3. a) Derive the mathematical expression for FM. 10
- b) Explain Foster seeley discriminator with neat block diagram and compare the performance with Ratio detector. 10
4. a) State and prove Sampling theorem and explain the aliasing error. 10
- b) Explain generation and demodulation of PPM. 10
5. a) Explain the Delta modulator Transmitter and receiver with neat block diagrams. 10
- b) The binary data 11010101 is transmitted over a baseband channel. Draw the waveform for transmitted data using the following data formats. 10
- (i) Unipolar NRZ (ii) Unipolar RZ (iii) Bipolar RZ (iv) Split phase Manchester  
(v) Polar quaternary NRZ.

[TURN OVER

6. Answer any four

20

- (a) Explain wired communication channel.
  - (b) Derive Friss formula.
  - (c) Explain QPSK.
  - (d) Compare TDM and FDM.
  - (e) Explain BFSK Transmitter.
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