

Duration: 3 hrs

Total Marks: 80

- N.B: (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 justifications

1. (a) Define ADT with an example (03)
 (b) What are the advantages of using linked lists over arrays? (05)
 (c) Describe Expression Tree with an example. (05)
 (d) Write a program in C to implement Insertion Sort (07)
2. (a) Discuss file I/O in C language with different library functions. (10)
 (b) Explain recursion as an application of stack with examples. (10)
3. (a) Write a menu driven program in C to implement QUEUE ADT. The program should perform the following operations: (12)
 - (i) Inserting an Element in the Queue
 - (ii) Deleting an Element from the Queue
 - (iii) Displaying the Queue
 - (iv) Exiting the program
 (b) Write a function to implement Indexed Sequential Search. Explain with an Example (08)
4. (a) Write a C program to implement a Doubly Linked List which performs the following operations: (12)
 - (i) Inserting element in the beginning
 - (ii) Inserting element in the end
 - (iii) Inserting element after an element
 - (iv) Deleting a particular element
 - (v) Displaying the list
 (b) Apply Huffman Coding for the word "MALAYALAM". Give the Huffman code for each symbol. (08)
5. (a) Explain any one application of linked list with an example. (08)
 (b) Write a program in C to delete a node from a Binary Search Tree. The program should consider all the possible cases. (12)
6. (a) Write a program in C to implement the BFS traversal of a graph. Explain the code with an example. (10)
 (b) Hash the following in a table of size 11. Use any two collision resolution techniques: (10)
 23, 55, 10, 71, 67, 32, 100, 18, 10, 90, 44.

Sem-III (Comp)

18105116

Electronic Circuits & Comm. Fundamentals
(CBGS & Revised)

QP Code : 30607

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. With neat diagram explain any one application of Zero-Crossing Detector 5
C. With neat block diagram explain how PLL can be used to generate large number of frequencies from a single reference frequency. 5
D. Explain with suitable example what do you understand by signal multiplexing? 5
- Q. 2. A. Derive an expression for trans-conductance for JFET. 10
B. List down various parameters of Opamp along with their typical values for IC741. Also explain what the significance of CMRR and Slew Rate is? 10
- Q. 3. A. Explain how operational amplifier can be used for taking average of three signals. 5
B. Explain fly wheel effect in Class C amplifier. 5
C. Explain Nyquist criteria. 5
D. Determine the magnitude of g_m for a JFET with $I_{DSS} = 8 \text{ mA}$ and $V_p = -4 \text{ V}$ at dc bias points $V_{GS} = -0.5 \text{ V}$ and also at $V_{GS} = -2.5 \text{ V}$. 5
- Q. 4. A. Explain generation of SSB using phase shift method. 10
B. Explain the use of PLL as FM detector. 10
- Q. 5. A. Explain super heterodyne receiver in detail along with the waveforms at each stage. 10
B. Explain the concept of amplitude modulation. 10
- Q. 6. A. Write short note on generation of FM by Armstrong method. 5
B. Mention important specifications of ADC and DAC required for communication. 5
C. Explain the necessity and significance of modulation in communication. 5
D. Compare n-channel and p-channel JFET with respect to their device features and voltage-current characteristics. 5

FW-Con. 10510-16.

QP Code : 30557

(3 Hours)

[Total Marks : 80]

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

Q 1.A) If $\int_0^{\infty} e^{-2t} \sin(t + \alpha) \cos(t - \alpha) dt = \frac{1}{4}$, find α (5)

B) Find half range Fourier cosine series for $f(x) = x$, $0 < x < 2$ (5)

C) If $u(x,y)$ is a harmonic function then prove that $f(z) = u_x - iu_y$ is an analytic function. (5)

D) Prove that $\nabla f(r) = f'(r) \frac{r}{r}$ (5)

Q.2) A) If $v = e^x \sin y$, prove that v is a harmonic function. Also find the corresponding analytic function. (6)

B) Find Z-transform of $f(k) = b^k$, $k \geq 0$ (6)

C) Obtain Fourier series for $f(x) = \frac{3x^2 - 6x\pi + 2\pi^2}{12}$ in $(0, 2\pi)$,
where $f(x+2\pi) = f(x)$. Hence deduce that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$ (8)

Q.3) A) Find inverse Laplace of $\frac{(s+3)^2}{(s^2+6s+5)^2}$ using Convolution theorem (6)

B) Show that the set of functions $\{\sin x, \sin 3x, \sin 5x, \dots\}$ is orthogonal over $[0, \pi/2]$. Hence construct orthonormal set of functions (6)

C) Verify Green's theorem for $\int_C \frac{1}{y} dx + \frac{1}{x} dy$ where C is the boundary of region defined by $x = 1$, $x = 4$, $y = 1$ and $y = \sqrt{x}$ (8)

TURN OVER

- 2 -

Q.4) Find $Z\{k^2 a^{k-1} U(k-1)\}$ (6)

B) Show that the map of the real axis of the z - plane is a circle under the transformation $w = \frac{z}{z+i}$. Find its centre and the radius. (6)

C) Express the function $f(x) = \begin{cases} \sin x & |x| < \pi \\ 0 & |x| > \pi \end{cases}$ as Fourier sine Integral. (8)

Q.5) A) Using Gauss Divergence theorem evaluate $\iint_S \bar{N} \cdot \bar{F} ds$

where $\bar{F} = x^2 \mathbf{i} + z \mathbf{j} + yz \mathbf{k}$ and S is the cube bounded by $x=0, x=1, y=0, y=1, z=0, z=1$ (6)

B) Find inverse Z-transform of $F(z) = \frac{z}{(z-1)(z-2)}$, $|z| > 2$ (6)

C) Solve $(D^2+3D+2)y = e^{-2t} \sin t$, with $y(0)=0$ and $y'(0)=0$ (8)

Q.6) A) Find Fourier expansion of $f(x) = 4 - x^2$ in the interval $(0,2)$ (6)

B) A vector field is given by $\bar{F} = (x^2 + xy^2) \mathbf{i} + (y^2 + x^2y) \mathbf{j}$. Show that \bar{F} is irrotational and find its scalar potential. (6)

C) Find (i) $L^{-1}\left\{\tan^{-1}\left(\frac{a}{s}\right)\right\}$
 (ii) $L^{-1}\left(\frac{e^{-\pi s}}{s^2 - (2s+2)}\right)$ (8)

---XXX---

SEM-III (CBSCS) COMP & I.T.
Object Oriented Programming
Methodology.

09/06/16.

QP Code : 30777

Instructions:

- (1) Question No 1 is compulsory (3 Hours)
(2) Attempt any three questions out of remaining
(3) Figures to right indicate full marks

TOTAL MARKS : 80

Question No.		Max. Marks
Q1(a)	Write a recursive method to calculate factorial of a integer number.	5
Q1(b)	Explain how Java is platform-independent.	5
Q1(c)	Explain bitwise operators available in java with example	5
Q1(d)	Write note on applet lifecycle	5
Q2(a)	Write a detailed note on System.arraycopy()	5
Q2(b)	Write a program to display following pattern:- 1 0 1 1 0 1 0 1 0 1	5
Q2(c)	With suitable example, explain creation and use of user defined packages.	10
Q3(a)	Identify classes and their attributes and draw the relationships that are described by the following rules. Include the multiplicities for each relationship. (i) Companies may employ many people, and people may work for many companies. Every employee in a company has a manager who may manage many subordinate employees. (ii) Library maintains books and magazines. A student can issue a book or return a book. A fine is charged if book is returned after 8 days. The magazines are not issued, but student can read it in library.	10
Q3(b)	Write a program to create vector objects with student names. Program should perform following operations based on choice: i) Add student name ii) Remove student name iii) Display -displays contents of vector using enumeration interface.	10
Q4(a)	Write a program to perform division of two numbers accepted from user. Handle the IOException, NumberFormatException and ArithmeticException using multiple try catch block.	10
Q4(b)	Draw sequence diagram for withdrawing an amount from ATM.	5
Q4(c)	Explain Cohesion and coupling with suitable example.	5
Q5(a)	Write a program to display the area of square and rectangle using the concept of overloaded constructor.	10
Q5(b)	With the help of suitable example explain how threads are created in Java.	5
Q5(c)	Explain multiple inheritance in Java with example.	5

2

QP Code : 30777

Q6	Write short notes on (any four) (a) Wrapper classes (b) Static data members and Methods (c) Abstract class & methods (d) Parameter passing to an applet (e) JVM	20
----	--	----

MUPD16448 SARDAR PATEL INSTITUTE OF TECHNOLOGY, ANDHERI (W) 6/9/2016 2:16:41 PM MUPD16448 SARDAR PATEL INSTITUTE

FW-Con. 12502-16.