



S.E. Sem-III (CBSGS), COMP.

Sub:- Electronic Circuits & Communication
Fundamentals.

QP Code : 4829

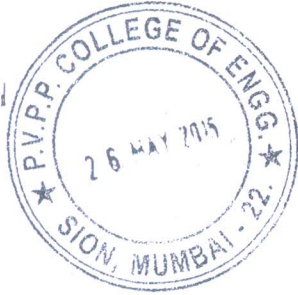
(3 Hours)

[Total Marks : 80

- N.B. : 1. Question No. ONE is compulsory
2. Solve any THREE out of remaining questions
3. Assume suitable data if required

- Q1. Solve the following 20 Marks
A. Draw and explain FET based Hartley and Colpitt Oscillator.
B. Comment on the following ADC/DAC specifications
I. Resolution
II. Linearity
III. Accuracy
IV. Settling Time
V. Stability.
C. How is adaptive delta modulation superior to delta modulation?
D. Discuss the factors that influence modulation index of an FM wave
- Q2. A. Sketch a block representation for an n-channel JFET, showing bias voltages, depletion regions, and current directions. Label the device terminals and explain its operation. Explain the effect of increasing levels of negative gate-source voltage. Also sketch a typical drain characteristics for $V_{GS}=0$ for an n-channel JFET. Explain the shape of the characteristic, identify the regions, and indicate the important current and voltage levels. 10 Marks
B. Design an op-amp differentiator that will differentiate an input signal with $f_{max}=100$ Hz. Draw the output waveform for a sine wave of 1 V peak at 100 Hz applied to the differentiator. Also repeat it for square wave input. 10 Marks
- Q3. A. Explain the different methods of biasing JFET along with their characteristics in detail. 10 Marks
B. Explain any one technique used of conversion of analog signal to digital with ADC 05 Marks
C. Draw and explain opamp inverting comparator. Draw input and output waveforms for $V_{ref}>0$ and also for $V_{ref}<0$. 05 Marks
- Q4. A. Draw Foster Seeley Discriminator with circuit diagram and explain its working with phasor diagrams? 10 Marks
B. What is DSBSC wave? Explain its generation using balanced modulator. 10 Marks
- Q5. A. Draw the PAM, PWM and PPM waveforms in time domain assuming a sinusoidal modulating signal. Explain them in brief. 10 Marks
B. In an AM radio receiver the loaded Q of the antenna circuit at the input to the mixer is 100. If the intermediate frequency is 455 KHz, calculate the image frequency and its rejection at 1 MHz. 05 Marks
C. With neat circuit diagram explain the use of PLL in frequency translator. 05 Marks
- Q6. A. What do you understand by signal multiplexing? Explain TDM and FDM with suitable examples. 10 Marks
B. Draw the spectrum of an amplitude modulated wave and explain its components 05 Marks
C. Compare class A and class C power amplifiers 05 Marks

UP-Con. 9830-15.



Sub :- Data Structures.

QP Code :4833

(3 Hours)

Total Marks: 80

- N.B.: (1) Question no. 1 is compulsory.
 (2) Attempt any three questions out of the remaining five questions.
 (3) Figures to the right indicate full marks.
 (4) Make suitable assumptions wherever necessary with justification.

- Q1 a) State differences between Singly Linked List and Doubly Linked List data structures along with their applications. 5
 b) What is a graph? Explain methods to represent a graph. 5
 c) What is binary search tree? Explain with an example. 5
 d) What is data structure? List out the areas in which data structures are applied extensively? 5
- Q2 a) Write a program in C to implement the quick sort algorithm. 8
 b) Define traversal of binary tree. Explain different types of traversals of Binary tree with examples. 6
 c) Explain infix, postfix and prefix expressions with examples. 6
- Q3 a) What is a circular queue? Write a program in C to implement circular queue. 10
 b) Explain linear and non-linear data structures with examples. 5
 c) Explain the term recursion with an example. 5
- Q4 a) Write a C program to convert infix expression into postfix expression. 10
 b) What is an AVL tree? Construct AVL tree for the following data. 10
 Mention the type of rotation for each case.
 50, 25, 10, 5, 7, 3, 30, 20, 8, 15
- Q5 a) Write a C program to implement doubly linked list. 10
 Provide following operations.
 i) Insert at beginning
 ii) Insert at location
 iii) Remove from beginning
 iv) Remove from Location
 b) What is Indexed Sequential Search? Write program in C to implement it. 10
- Q6 a) What is heap? Consider the following list of numbers: 10
 15, 19, 10, 7, 17, 16
 Sort these numbers using heap sort.
 b) Explain Huffman Algorithm with an example 5
 c) What is a file? Explain various file handling operations in C. 5

 JP-Con.: 10645-15.

S.E. Sem III CBGS Comp. DLDA

1/6/15

Q.P. Code : 4836

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No. 1 is compulsory.
(2) Assume suitable data if necessary.
(3) Attempt any three questions out of the remaining five.

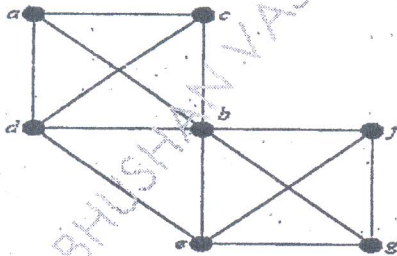
1. (a) Convert $(121.2)_3$ into base 10. 2
(b) Represent $(52)_{10}$ into Excess - 3 code and Gray code. 2
(c) Find the one's complement and two's complement of $(57)_{10}$. 2
(d) Realize $y = AB + \overline{AB}$ using NAND gates only. 2
(e) Obtain hamming code for 1011. 2
(f) Convert $(126)_{10}$ to Octal, Hexcode. 2
(g) State demorgans law. 2
(h) Convert $(214.32)_{10}$ to binary. 2
(i) Perform binary subtraction using 2's complement for $(62)_{10}$ and $(99)_{10}$ 4
2. (a) Minimize the logic function using Quine-McCluskey method.
 $f(A,B,C,D) = \sum m(1,3,7,9,10,11,13,15)$ 12
(b) Implement the following expression using single 4:1 Mux.
 $f = (A,B,C,D) = \sum m(0,1,2,4,6,9,12,14)$ 8
3. (a) Design a 4-input (A,B,C,D) digital circuit that will give at its output (X) a logic 1 only if the binary number formed at the input is between 2 and 9 (including). 10
(b) Simplify $Y = \overline{(A + \overline{A} B)} (C + \overline{D})$ 5
(c) Design 1 bit comparator using logic gates. 5
4. (a) Given the logic expression
 $A + \overline{B} \overline{C} + AB \overline{D} + ABCD$ 12
(i) Express in standard SOP
(ii) Draw K-map for the equation.
(iii) Minimize and realize using NAND gates only.
(b) Design 8 bit BCD adder. 8
5. (a) Design a mod 5 synchronous up counter using JK FF. 10
(b) Convert SR FF to TFF and JK FF. 10
6. Write short note on (any three) 20
(a) VHDL
(b) Multivibrators
(c) Gray code & Excess-3code
(d) Johnson Ring Counter

JP-Con. 11377-15.



- 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) Let $A=\{a,b,c\}$. Show that $(P(A),\subseteq)$ is a poset. Draw its Hasse Diagram. (05M)
 $P(A)$ is the power set of A .
- b) Find the generating function for the following finite sequences (05M)
 i) 1,2,3,4,... ii) 1,1,1,1,1,1
- c) Is it possible to draw a tree with five vertices having degrees 1,1,2,2,4? (05M)
- d) Prove $p \wedge (q \vee r)$ and $(p \wedge q) \vee (p \wedge r)$ are logically equivalent. (05M)
- Q.2 a) If $f:A \rightarrow B$ be both one-to-one and onto, then prove that $f^{-1}: B \rightarrow A$ is also both one-to-one and onto. (04 M)
- b) 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 $a,b \in G$. Prove that $(G,*)$ is a group. (08 M)
- c) Define Equivalence relation with an example. Let m be a positive integer other than 1. Show that the relation $R = \{(a,b) | a \equiv b \pmod{m}\}$ i.e. m divides $a-b$ is an equivalence relation on the set of integers. (08 M)
- Q.3 a) Show that the set of all divisors of 70 forms a lattice. (04 M)
- b) Consider the (3,5) group encoding function defined by (08 M)
- | | |
|----------------|----------------|
| $e(000)=00000$ | $e(001)=00110$ |
| $e(010)=01001$ | $e(011)=01111$ |
| $e(100)=10011$ | $e(101)=10101$ |
| $e(110)=11010$ | $e(111)=11000$ |
- Decode the following words relative to a maximum likelihood decoding function.
 i) 11001 ii) 01010 iii) 00111
- c) Define Reflexive closure, Symmetric closure along with a suitable example. Let R be a relation on set $S = \{a,b,c,d,e\}$, given as
 $R = \{(a,a), (a,d), (b,b), (c,d), (c,e), (d,a), (e,b), (e,e)\}$
 Find transitive closure using Warshall's Algorithm. (08 M)
- Q.4 a) Determine Euler Cycle and path in graph shown below (04 M)



- b) A survey of 500 television watchers produced the following information:
 285 watch football games, 195 watch hockey games, 115 watch basket ball games, 45 watch football and basketball games, 70 watch football and hockey games, 50 watch basketball and hockey games. 50 do not watch any three kinds of games. Find: (08 M)

- i) How many in the survey watch all 3 kinds of games?
 ii) How many watch exactly one of the sports languages?
 iii) Draw Venn Diagram showing results of the survey.

c) Find the solution to the recurrence relation

(08 M)

$$a_n = 6a_{n-1} + 11a_{n-2} - 6a_{n-3} \text{ given } a_0 = 20, a_1 = 5 \text{ and } a_2 = 15$$

Q.5 a) Show that if every element in a group is its own inverse, then the group must be abelian. (04M)

b) Explain Pigeonhole principle and Extended Pigeonhole Principle. Show that if 7 colors are used to paint 50 bicycles, at least 8 bicycles will be of same color. (08M)

c) i) Prove by mathematical induction $x^n - y^n$ is divisible by $x - y$. (04 M)

ii) Consider the group $G = \{1, 2, 3, 4, 5, 6\}$ under multiplication modulo 7 (04 M)

a) Find multiplication table of G

b) Find inverse of every element

Q.6 a) Show that $A - (B - C) = (A - B) \cup (A \cap B \cap C)$

(04 M)

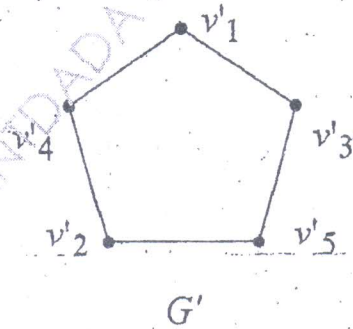
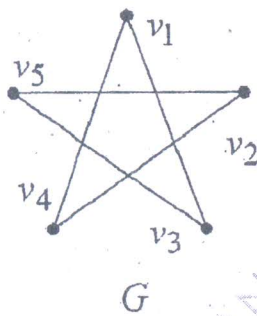
b) Let $H =$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Be a parity check matrix. Determine the group code $e_H: B^3 \rightarrow B^6$

(08M)

c) Determine if following graphs G and G' are isomorphic or not. (08M)



- N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any three from remaining.

1. (a) Write a program to calculate GCD of two numbers in JAVA. 5
(b) Explain any three features of JAVA. 5
(c) Draw and explain applet life cycle. 5
(d) Explain wrapper class and its applications. 5
2. (a) Write a program in JAVA to display following pattern. (Take input for number of rows from command line) 5
1
1 2
1 2 3
1 2 3 4
(b) Write a note on System.arraycopy (). 5
(c) Identify classes and their attributes and draw the relationships specified by following problem. 10
(i) Bank maintains two kinds of accounts for customer, Saving account & current account. Saving account provides compound interest and withdrawal facility. Current account provides cheque book facility but no interest.
(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.
3. (a) What is a package ? Explain with example the steps to create package and add a class or an interface. 10
(b) Write a program to create vector objects with student names. Program should perform following operations based on choice : 10
(i) Add student name - To add new student name in the vector.
(ii) Remove student name -Removes student name if already exists else display appropriate message.
(iii) Display-Display contents of vector.
4. (a) What is Exception ? Explain how JAVA handles an Exception using following keywords : 10
try, catch, throw, throws & finally

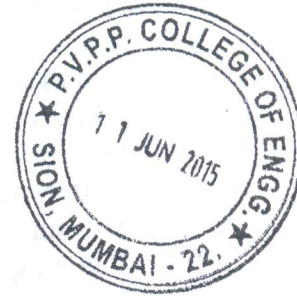
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Q.P. Code : 4842

2

- (b) Write a program to read and display details of ten Employees with following specifications : 10
Data Members : Emp_ID, Emp_name, Emp_Salary
Parameterized constructor to initialize data members of Employees and Member functions :
Display () - to display information of all employees
5. (a) With the help of suitable example explain how threads are created in JAVA. 5
(b) Explain multiple inheritance in JAVA with example 5
(c) Write a program to count the number of alphabets, digits and special symbols from string. 10
6. Write short notes on (any four) 20
(a) Method overloading & overriding
(b) Static data members & methods
(c) Abstract class & methods
(d) Constructor & its type
(e) JVM.



JP-Con. 12565-15.



S.E. (Sem-III), (OLD), COMP.

Sub:- Data Structure & Files.

QP Code : 4602

(OLD COURSE)

(3 Hours)

Total Marks: 100

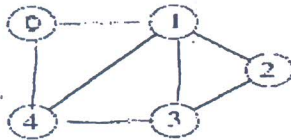
- N.B. (1) Question No. 1 is Compulsory.
 (2) Attempt any 4 questions out of the remaining six questions
 (3) Assume any suitable data wherever required but justify the same.
 (4) Use diagrams wherever necessary

- Q1. a) What are different methods to represent graph in memory? Explain in detail. 10
 b) Explain the terms Data structure and ADT with examples. 10

- Q2. a) Write a program in Java to implement stack using an array or linked list. Provide push, pop, stack top and display operations. 10
 b) Write a Java program to implement insertion Sort. Explain the same with example. 10

- Q3. a) Write a program in Java to delete a node. Consider all cases. 10
 b) What is a priority queue? Explain with example. 10

- Q4. a) Provide adjacency matrix and adjacency list representation of the following graph



- b) Write a Java program for singly circular linked list. Provide the following operations: 10
 Insert at beginning, remove from beginning, search and traverse.
 c) Explain recursion with examples. 5

- Q5. a) Write a Java program for Binary Search Tree pre-order traversal. 10
 b) Explain Huffman coding. For the following set of values and their frequencies construct Huffman tree and find Huffman code for each value. 10

FREQUENCY	VALUE
5	1
7	2
10	3
15	4
20	5
45	6

- Q6. a) Explain any two collision resolution techniques with example. 10
 b) Explain prefix, postfix and infix notations with examples. 10
 Explain conversion of infix expression to postfix expression with an example

- Q7. Write short notes on any 4 20
 1. AVL tree and multiway trees
 2. sequential files
 3. Circular queues.
 4. B-Tree
 5. Hashing

- N.B.: (1) Solve any four questions out of remaining five questions.
 (2) All questions carry equal marks as indicated by figures to the right.
 (3) Assume appropriate data whenever required. State all assumptions clearly.

Q.1 a) Use mathematical induction to show that

(05M)

$1+2+3+\dots+n=n(n+1)/2$ for all natural number values of n .

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) a) $A \oplus B = (A-B) \cup (B-A)$ b) $(A \cup B) = A^c \cap B^c$

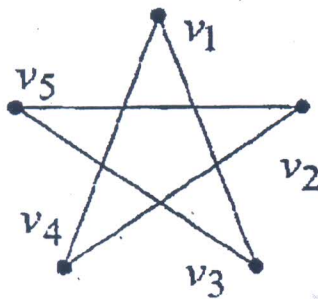
(05M)

d) How many vertices are necessary to construct a graph with exactly 6 edges in which each vertex is of degree 2.

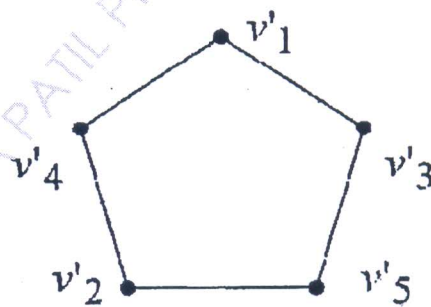
(05M)

Q.2 a) Find if the following two graphs are isomorphic.

(04 M)



G



G'

b) Let the functions $f, g,$ and h defined as follows:

(08 M)

$f: \mathbb{R} \rightarrow \mathbb{R}, f(x) = 2x + 3$

$g: \mathbb{R} \rightarrow \mathbb{R}, g(x) = 3x + 4$

$h: \mathbb{R} \rightarrow \mathbb{R}, h(x) = 4x$

Find $g \circ f, f \circ g, f \circ h, h \circ f, h \circ g, h \circ h$

c) Consider set $G = \{1, 2, 3, 4, 5, 6\}$ under multiplication module 7

(08 M)

- I. Find the multiplication table of the above.
- II. Find the inverse of 2, 3, and 5, 6
- III. Prove that it is a cyclic group
- IV. Find the orders and subgroups generated by $\{3, 4\}$ and $\{2, 3\}$

Q.3 a) How many friends must you have to guarantee that at least five of them will have birthdays in the same month.

(04 M)

b) Show that the $(3, 6)$ encoding function $e: B^3 \rightarrow B^6$ defined by

(08 M)

$e(000)=000000$ $e(001)=000110$
 $e(010)=010010$ $e(011)=010100$
 $e(100)=100101$ $e(101)=100011$
 $e(110)=110111$ $e(111)=110001$ is a group code.

c) Let R be a relation on set $S = \{a,b,c,d,e\}$, given as
 $R = \{(a,a), (a,d), (b,b), (c,d), (c,e), (d,a), (e,b), (e,e)\}$
 Find transitive closure using Warshall's Algorithm. (08 M)

Q.4 a) Draw Hasse Diagram for the poset $A = \{1, 2, 3, 6, 12, 24, 36, 72\}$ under the divisibility relation. Is this poset a lattice? Justify (04 M)

b) Consider Z together with binary operations of \oplus and \otimes which are defined by (08 M)

$$x \oplus y = x + y - 1$$

$$x \otimes y = x + y - xy$$

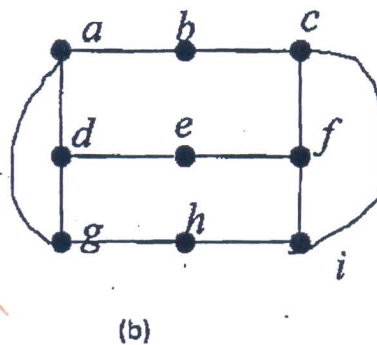
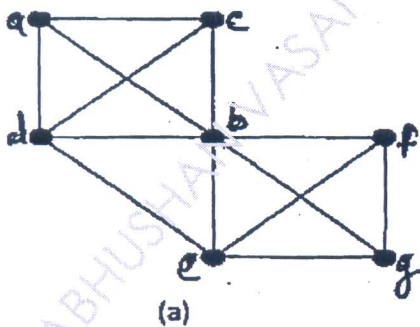
then prove that (Z, \oplus, \otimes) is a ring.

c) Solve $a_r - a_{r-1} - 6a_r = -30$ given $a_0 = 20, a_1 = -5$ (08 M)

Q.5 a) Let R be the relation on the set of integers defined by $x R y$ if $x-y$ is divisible by 4. Show that R is an equivalence relation. (04 M)

b) i) Determine Hamiltonian Cycle and path in graph shown in (a)

ii) Determine Euler Cycle and path in graph shown in (b)



c) A survey of 500 television watchers produced the following information:

285 watch football games, 195 watch hockey games, 115 watch basket ball games, 45 watch football and basketball games, 70 watch football and hockey games, 50 watch basketball and hockey games. 50 do not watch any three kinds of games. Find: (08 M)

- i) How many in the survey watch all 3 kinds of games?
- ii) How many watch exactly one of the sports languages?
- iii) Draw Venn Diagram showing results of the survey.



6. (a) Show that if every element in a group is its own inverse, then the group must be abelian. (04 M)

(b) Let $H =$ (08 M)

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

Be a parity check matrix. Determine the group code $e_H: B^3 \rightarrow B^6$ (08 M)

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

7. (a) If $f: A \rightarrow B$ be both one-to-one and onto then prove that $f^{-1}: B \rightarrow A$ is also both one-to-one and onto (04 M)

(b) Define the following with examples (08 M)

(i) Subgroup

(ii) Distributive Lattice

(iii) Quantities

(iv) Reflexive closure

(c) If addition and multiplication modulo is defined on set of integers $R = \{0, 2, 4, 6, 8\}$ then show that the system is an integral domain. (08 M)



(OLD COURSE)

QP Code : 4611

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Assume suitable **data** wherever **required**.
(4) **Figures** to the **right** indicate **full** marks.

- | | | |
|--------|--|----|
| 1. (a) | Explain Booth's Algorithm with example. | 10 |
| (b) | Explain the Von Neumann architecture with the help of diagram. | 10 |
| 2. (a) | Explain the interleaved memory in detail. | 10 |
| (b) | Explain different mapping technique of Cache Memory. | 10 |
| 3. (a) | Compare and explain static and dynamic data flow computers. | 10 |
| (b) | Explain SPARC processor in detail. | 10 |
| 4. (a) | Explain with neat diagram systolic processor. | 10 |
| (b) | Explain design of control unit with respect to softwired and hardwired approach. | 10 |
| 5. (a) | Explain IEEE 754 formats. Explain with example. | 10 |
| (b) | Explain different instruction formats with suitable example. | 10 |
| 6. (a) | List and explain the characteristics of memory. | 10 |
| (b) | List and explain various page replacement techniques. | 10 |
| 7. | Solve any two. | 20 |
| (a) | Comparison of RISC and CISC | |
| (b) | RAID | |
| (c) | Difference between SRAM & DRAM | |
| (d) | Wave front Array. | |

RJ-Con. : 12535-15.

