S.E. computer Sem III (old). 14/5/15 1/3

App. Maths-III

(OLD COURSE) QP Code : **4596**

(3 Hours) **[Total Marks : 100**

N.B. (1) Question no. **1** is **compulsory.**
(2) Attempt any **four** questions from remaining **six** questions
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Find A^{-1} where 5

$$A=\begin{bmatrix}1 & 2 & 2\\ 2 & 3 & 1\\ 1 & 2 & 1\end{bmatrix}$$ Also verify that $A(\text{adj } A)=|A|.I$

(b) Find $L\{te^{-4t}\sin 3t\}$ 5

(c) Find the Fourier series of $f(x)=1-x^2$ on the interval $(-1, 1)$ 5

(d) Find z-transform of $f(x)=\frac{\alpha^k}{k}$, $k\geq 1$ 5

2. (a) Find $L[\sinh^5 t]$ 6

(b) Find the Fourier series for 6

$$f(x)=\begin{cases}-\pi & -\pi\leq x<0\\ x & 0\leq x\leq\pi\end{cases}$$

(c) Find the rank of 8

$$A=\begin{bmatrix}2 & 1 & 3 & 4\\ 3 & -1 & 2 & 2\\ 4 & 1 & 0 & -1\\ 9 & 1 & 5 & 6\end{bmatrix}$$

by reducing it to normal form.

3. (a) Find $L^{-1}\left\{\frac{(s^2+2s+3)}{(s^2+2s+2)(s^2+2s+5)}\right\}$ 6

by convolution theroem.

(b) Prove that every Hermitian matrix A can be written as P+ iQ where P is real symmetric and Q is real skew-symmetric matrix 6

[TURN OVER

(c) Find half rage cosine series for $f(x) = (x-1)^2$ where $0 < x < 1$ 8

Hence find $\sum_{n=1}^{\infty} \frac{1}{n^2}$ and $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$

4. (a) Solve $\frac{d^2y}{dt^2} + \frac{2dy}{dt} + y = 3te^{-t}$ 6

Given $y(0)=4$, $y'(0)=2$ using Laplaces transformation

(b) Prove that $f_1(x)=1$, $f_2(x)=x$, $f_3(x)=\left(\frac{3x^2-1}{2}\right)$ 6

are arthogonal over (-1, 1)

(c) Find λ and μ such that the equations $x + 2y + \lambda z = 1$, $x + 2\lambda y + z = \mu$, $\lambda x + 2y + z = 1$ 8
have (i) no solution (ii) only one solution (iii) infinite many solutions

5. (a) Find $L^{-1}\left\{\tan^{-1}\frac{2}{s^2}\right\}$ 6

(b) Prove that $A = \frac{1}{3}\begin{bmatrix} -2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & -2 & 2 \end{bmatrix}$ is orthogonal and hence find A^{-1} 6

(c) Find the Fourier Sine Transform of f(x) if 8

$f(x) = 0 \quad 0 < x < a$

$= x \quad a \le x \le b$

$= 0 \quad x > b$

6. (a) Prove that if A is a skew-symmetric matrix of odd order then A is singular 6

(b) Obtain complex form of Fourier series of $f(x) = e^{ax}$ in $(-\pi, \pi)$, where a is not an integer. 6

(c) Find inverse z-transform of $F(z) = \frac{1}{(z-3)(z-2)}$ 8

if ROC is (i) $|z| < 2$ (ii) $2 < |z| < 3$ (iii) $|z| > 3$

7. (a) Find $L^{-1}\left\{\frac{e^{4-3s}}{(s+4)^{5/2}}\right\}$ 6

(b) If $f(k) = 4^k U(k)$ and $g(k) = 5^k U(k)$ then find the z - transform of $f(k) * g(k)$ 6

(c) Obtain Fourier series for 8

$$f(x) = x + \frac{\pi}{2} \qquad -\pi < x < 0$$

$$= \frac{\pi}{2} - x \qquad 0 < x < \pi$$

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

Also deduce that $\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \ldots\ldots\ldots$

SE sem IV (old) Comp. Engg.
DLDA 01/06/15

(OLD COURSE) Q.P. Code : **4605**

(3 Hours) [Total Marks : 100

N.B. (1) Question No. 1 is compulsory.
(2) Attempt any four out of remaining Q.2 to Q.7.\
(3) Assume suitable data if required.

1. (a) Subtract $(10)_{10} - (33)_{10}$ using 2's complement number system. 5
(b) Convert JK FlipFlop to T FlipFlop. 5
(c) What are error detecting and error correcting codes. 5
(d) Compare Asynchronous and synchronous counters. 5

2. (a) Simplify the logic function using k-map and implement it using AND-OR gates. 10
$F(A, B, C, D) = \Sigma m\ (0, 1, 2, 4, 8, 9, 12) + d\ (11,15)$
(b) Design 2 bit asynchronous up/down counter using T-Flip Flop. 10

3. (a) Explain any one shift register using Jk Flip Flops 10
(b) Design full adder using AND-OR gates. 10

4. (a) Implement the following function using single 8:1 multiplexers. 10
$f(A,B,C,D) = \Sigma m(0, 1, 4, 5, 9) + d(11)$
(b) Perform without conversion. 10
(i) $(44B)_H - (1AD)_H$ (ii) $(77)_8 * (32)_8$

5. (a) Reduce using Boolean Algebra 10
(i) $AB + \overline{AC} + A\bar{B}C(AB + C)$ (ii) $\left(A + \bar{B} + AB\right)\left(A + \bar{B}\right)\left(\bar{A}B\right)$
(b) Design full subtracter using universal gates NAND. 10

6. (a) Using Quine Mc-cluskey method, simplify the following function and design using NOR gates. 10
$F(A,B,C,D) = \pi M(0,1,4,5,10,11,12,14)$
(b) Explain the transfer characteristics of TTL NAND gate. 10

7. Write short notes on : 20
(a) Arithmatic Logic Uit
(b) Universal gates
(c) Applications of Flip Flops
(d) Weighted codes.

RJ-Con. 11340-15.

S.E - Sem 3 (old) (Comp) · 5/6/15
DSGT

(OLD COURSE) **Q.P. Code : 4607**

(3 Hours) **[Total Marks : 100**

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)

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

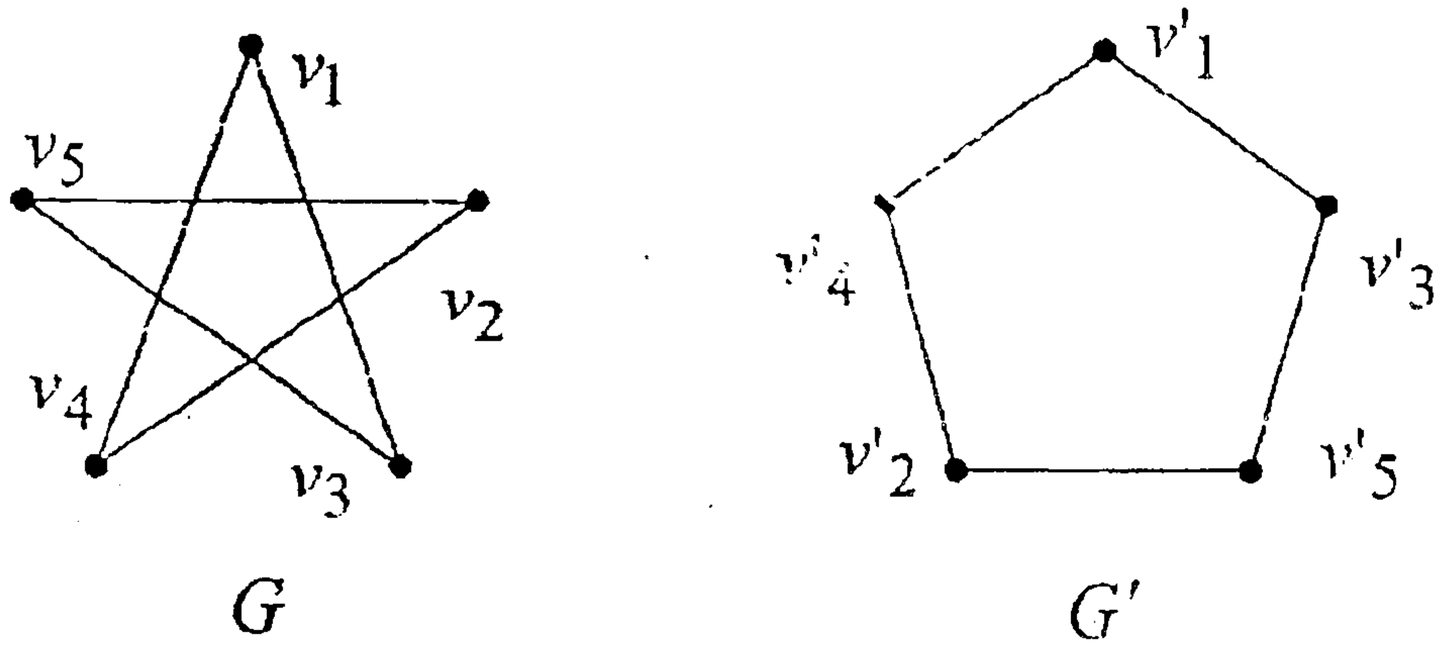
b) Find the generating function for the following finite sequences (05M)

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)

$f:R \to R$, $f(x)=2x+3$

$g: R \to R$, $g(x)=3x+4$

$h: R \to R$, $h(x)=4x$

Find gof, fog, foh, , gofoh

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 $e:B^3 \to B^6$ 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 $\odot$ which are defined by (08 M)

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

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

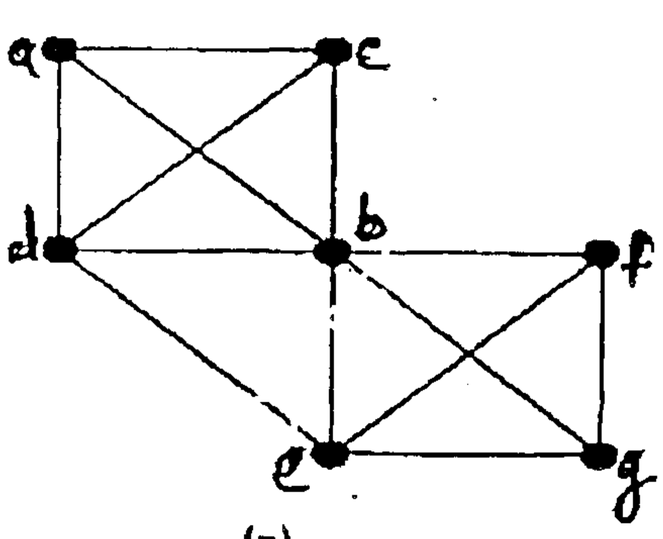
then prove that $(Z, \oplus, \odot)$ is a ring.

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

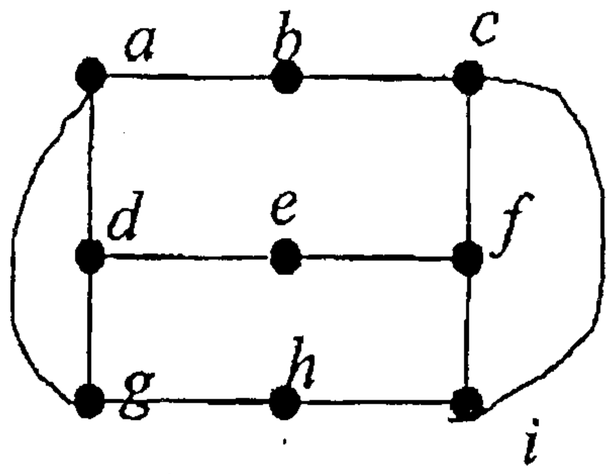
Q.5 a) Let R be the relation on the set of integers defined by $x \mathrel{R} y$ if x-y is divisible by 4. Show that R is an equivalence relation. (04 M)

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

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



(a)



(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 multiplicaion modulo is defined on set of integres R = {0,2,4,6,8} then show that the system is an integral domain. (08 M)

SE (Old) COA 11/6/2015
Sem III (Comp.)
(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 Newmann 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.
