SE comp sem-III (old) App. maths
20/11/14

(OLD COURSE) **QP Code :12210**

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

N. B. : (1) **Question 1 is compulsory.**
(2) Attempt any **FOUR** of the remaining.
(3) **Figures** to the right indicate **full** marks.

1. (a) If a matrix $A=\begin{bmatrix} -4 & -3 & -2 \\ -1 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix}$ then find adjA 5

(b) Find $L\left\{\frac{\sin^2 2t}{t}\right\}$ 5

(c) Find Z-transform of $f(K) = 3^k$, $k \geq 0$ 5

(d) Find half range Fourier cosine series for $f(x) = x$, $0 < x < \pi$ 5

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

(b) Find Laplace Transform of $f(t) = a$, $0 < t < b$
$= 0$, $t > b$ 6

(c) Test the consistency of following equations and solve them if consistent 8
$x - 2y + 3t = 2$, $2x + y + z + t = 4$, $4x - 3y + z + 7t = 8$

3. (a) Evaluate $\int_0^\infty e^{-t}\left(\int_0^t e^{-4u}\cos u\,du\right)dt$ 6

(b) Find inverse Z-transform of $f(z) = \frac{1}{(z-1)(z-2)}$ for $1 < |z| < 2$ 6

(c) Find Fourier series for $f(x) = \frac{3x^2 - 6x\pi + 2\pi^2}{12}$ in $(0, 2\pi)$ 8

Hence, deduce that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\ldots$

4. (a) Show that the set of functions cosnx, n = 1,2,3,... is orthogonal on $(0,2\pi)$ 6
(b) Express the following matrix A as sum of symmetric and skew-symmetric matrix 6

Where $A = \begin{bmatrix} 2 & -4 & 9 \\ 14 & 7 & 13 \\ 3 & 5 & 11 \end{bmatrix}$

(c) Solve $(D^2-3D+2)y = 4e^{2t}$, with $y(0) = -3$ and $y'(0) = 5$ 8

5. (a) Solve following using Convolution theorem 6

$$L^{-1}\left\{\frac{1}{(s^2+a^2)^2}\right\}$$

(b) Find Fourier Series expansion for $f(x) = 1-x^2$ on $(-1,1)$ 6

(c) Find Fourier Cosine integral representation for $f(x) = e^{-ax}$, $x > 0$ 8

Hence show that $\int_0^\infty \frac{\cos ws}{1+w^2} dw = \frac{\pi}{2} e^{-x}$

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

(b) Find rank of $A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}$ converting to normal form. 6

(c) Obtain Fourier expansion of $f(x) = x^2$ where $-\pi \le x \le \pi$ 8

Hence, deduced that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots$

7. (a) Show that the matrix $A = \frac{1}{2}\begin{bmatrix} \sqrt{2} & -i\sqrt{2} & 0 \\ i\sqrt{2} & -\sqrt{2} & 0 \\ 0 & 0 & 2 \end{bmatrix}$ is Unitary and hence, find A^{-1} 6

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

(c) Obtain the complex form of Furier series of $f(x) = e^{ax}$ in $(-L,L)$ 8

S.E (III) Computer CI D
Electronic Devices & Linear ICs

(OLD COURSE) **QP Code :12240**

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

N.B. : (1) Questions No.1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume suitable **data** if **necessary**.

1. (a) Explain the Block diagram of an OP-AMP **20**
(b) Differentiate between BJI and FET
(c) Realize the following relation using practical OP-amp.

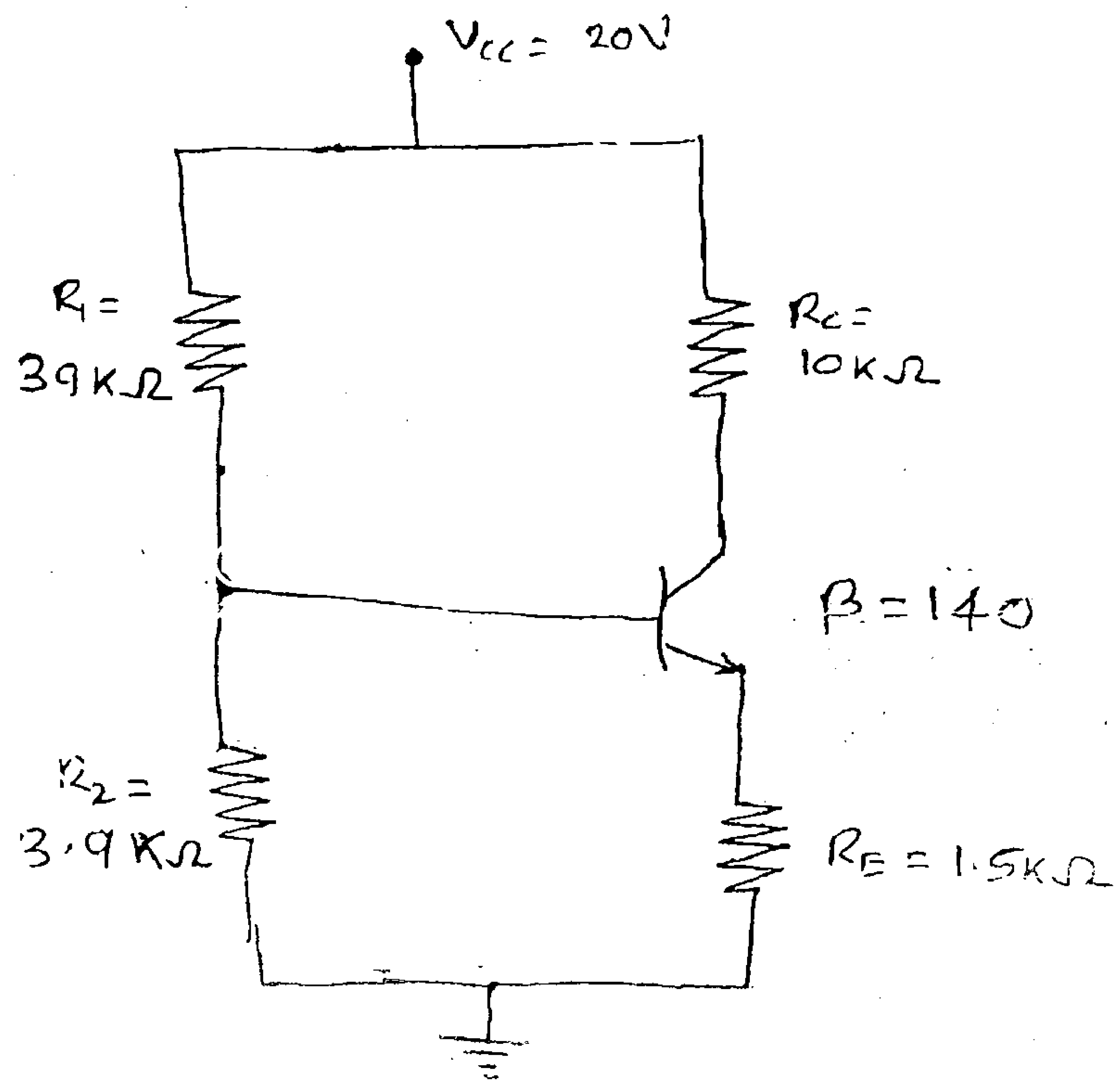
$$Vo = 5V_1 - 5V_2 + 3V_3$$

(d) Explain series Voltage Regulator.

2. (a) Explain the Graphical Determination of the h-parameters using the characteristic curves of common emitter amplifier. **10**
(b) Determine the following : - **10**

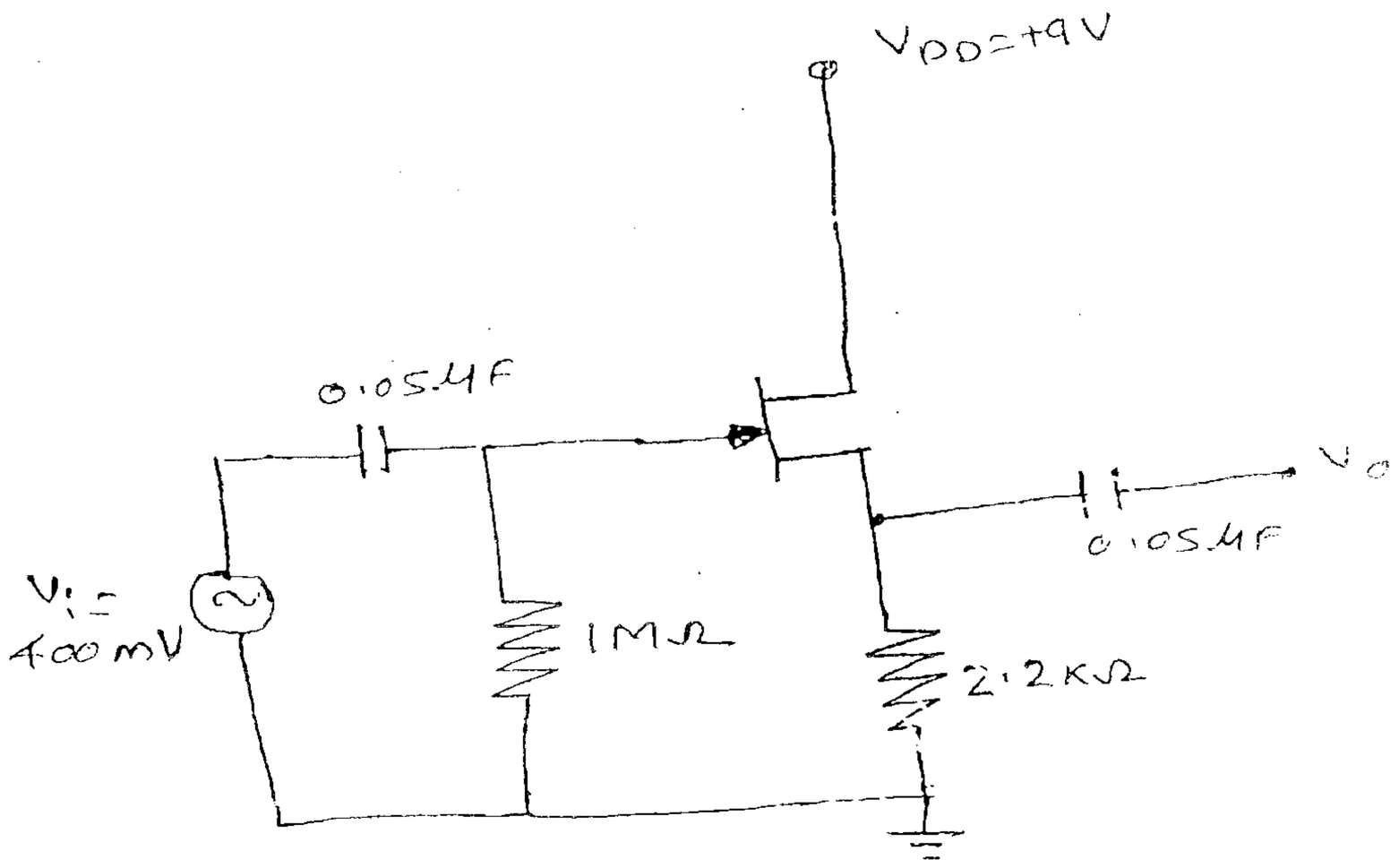
(i) I_{BQ} (ii) I_{CQ} (iii) V_{CEQ} (iv) V_{CQ}
(v) V_{EQ} (vi) V_{BQ}

for the circuit show below :



3. (a) Derive equations for Zi, Zo, Av for common source configuration using voltage Divider Network (with unbypassed Rs) 10

(b) Calculate Zi, Zo Av for the circuit shown below assume 10
I_{DSS} = 16mA, Vp = –4V, Y_{os} = 25 µs and V_{GSQ} = –2.86V



4. (a) Explain OP.AMP as a Differentiator and Integrator. 10

(b) Explain Successive Approximation Resistor A/D converter. 10

5. (a) Explain Instrumentation Amplifier using Transducer Bridge Circuit. 10

(b) Design +9V regulator using LM 723 use current limit of 100mA. 10

6. (a) Explain the operation of monostable multivibrator using IC 555. 10

(b) Explain OP-AMP as a 10

(i) Comparator (ii) Summing Amplifier.

7. (a) Write short notes on :– 20

(a) Features of 555 Timer

(b) Zero crossing Detector

(c) Inverting Schmitt trigger

(d) PLL

S & Comp (Sem 3) (Old).
DLDA

8/12/14.

(OLD COURSE) **QP Code :12312**

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

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

1. (a) Using Quine-Mc-Cluskey Method, determine the minimal SOP form for **10**
$F(A, B, C, D) = \Sigma m\ (4, 5, 8, 9, 11, 12, 13, 15)$.
(b) Design 4–bit Binary to Gray code converter. **10**

2. (a) Implement following expression using single 4:1 mux. **10**
$F(A, B, C, D) = \Sigma m\ (2, 6, 8, 12, 13, 14)$.
(b) Explain the operation of 4–bit universal shift register. **10**

3. (a) Draw 2–input TTL NAND gate and explain list important chara. of TTL family. **10**
(b) Design MOD–6 synchronous counter and explain its operation. **10**

4. (a) Convert $(243.63)_8$ to decimal, binary and hexadecimal **10**
(b) Obtain Hamming code for 1010. Prove that hamming code is error detecting and correcting code. **10**

5. (a) Simplify following expression using K-map and realize using only NAND gate. **10**
$F(A, B, C, D) = \Sigma m\ (1, 2, 3, 8, 9, 10, 11, 14) + d(7, 15)$.
(b) Simplify following expression using Boolean laws **10**
(i) $\overline{\overline{AB} + \overline{A} + AB}$ (ii) $A\left[B + C\left(\overline{AB + AC}\right)\right]$

6. (a) What is Race-Round condition ? How it is overcome in M–S J–K FFs. **10**
(b) (i) Explain difference between asynchronous counter and synchronous counter. **5**
(ii) State and explain any two application of FFs. **5**

7. Write short notes on :– **20**
(a) De Morgan's Theorm
(b) Priority Encoder
(c) MUX and DEMUX

S.E Computer Sem(3)(old). 12/12/14.

Discrete Structures & Graph Theory

QP Code :12349

(OLD COURSE)

(3 Hours) [Total Marks : 100

N.B : (1) Question **No. 1 is compulsory.**
(2) Answer any **four** out of remaining **six** questions.
(3) Assume appropriate data wherever required. State all assumption clearly.

1. (a) Use Mathematical Induction to show that :— **5**

$$1+5+9+\ldots\ldots+(4n-3)=n(2n-1)$$

(b) Construct the Hasse diagram of the following relation R. **5**

$A=\{1,2,3,4\}$

$R=\{(1,1),(1,2),(2,2),(2,4),(1,3),(3,3),(3,4),(1,4),(4,4)\}$

(c) If $A=B=C=R$ where R is a set of real number and $f: A \to B$ $g: B \to C$ are functions defined by **5**

$f(x)=x+1$

$g(x)=x^2+2$ then find

(i) (gof) (x) (ii) (fog) (x).

(d) Draw the following graphs. **5**

(i) Eulerian but not Hamiltonian

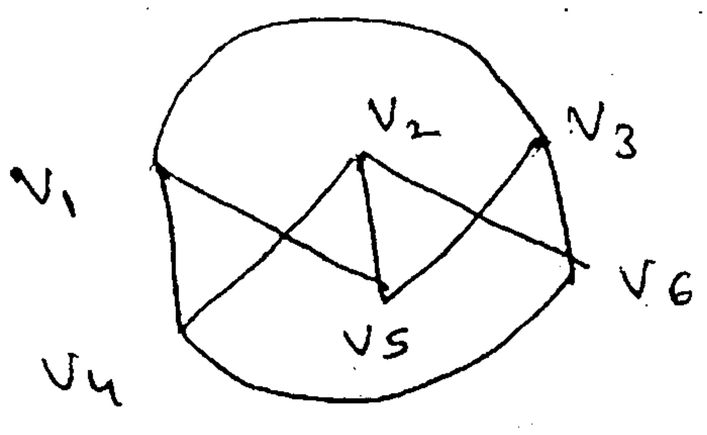
(ii) Hamiltonian but not Eulerian.

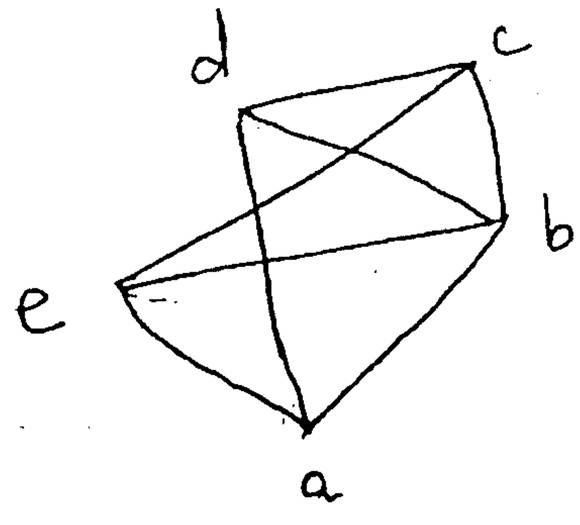
2. (a) In a survey of 500 students it was found that 300 are locals, 300 use glasses and 275 are vegetarians. 200 are locals who use glasses, 170 are locals who are vegetarians, 200 of them use glasses and are vegetarians and 125 are locals who use glasses and are vegetarians. **8**

(i) Find the number of students who are not local students, who do not use glasses and who are not vegetarians.

(ii) Find the number of students who are local, who do not use glasses and who are not vegetarians.

(b) Are the following graphs planer? If yes show how? **6**





(c) Prove the following by Mathematical Induction :— 6

$$2+5+8+.....+(3n-1)=\frac{n(3n+1)}{2}$$

3. (a) Define the following terms by giving example of illustration. 8

(i) Star Graph (ii) Regular Graph

(iii) Complete Bipartite Graph (iv) Pendant Vertex.

(b) Show that the set of all divisors of 70 forms a Lattice. 6

(c) Solve the recurrence relation 6

$$a_n + 3a_{n-1} + 3a_{n-2} + a_{n-3} = 0$$

With $a_0 = 5, a_1 = -9, a_2 = 15$.

4. (a) Let R and S be the relation on A 6

$A = \{1, 2, 3, 4\}$ defined by

$R = \{(1, 1), (3, 1), (3, 4), (4, 2), (4, 3)\}$

$S = \{(1, 3), (2, 1), (3, 1), (3, 2), (4, 4)\}$

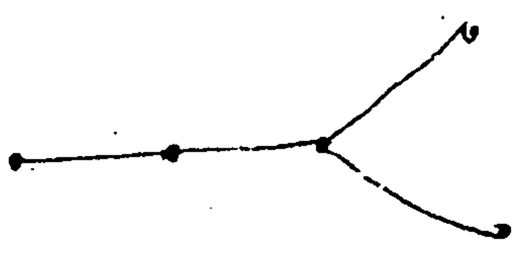
find R^{-1}, S^2, R o R^{-1}

(b) Consider the (2, 5) group encoding function e : $B_2 \rightarrow B_5$ defined by 8

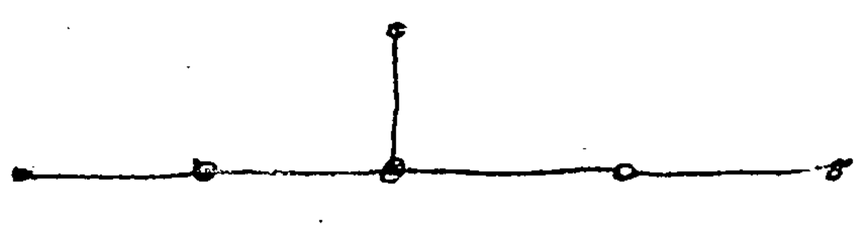
e(00)	=	0	0	0	0	0
e(01)	=	0	1	1	1	0
e(10)	=	1	0	1	0	1
e(11)	=	1	1	0	1	1

Decode the following relation to maximum likelihood decoding function.

(c) Is G_1 and G_2 Isomorphic? 6



G_1



G_2

5. (a) Write english sentences corresponding to the following statement. 8

(i) $(\sim p) \wedge q \rightarrow r$

(ii) $r \rightarrow (p \vee q)$

(iii) $\sim r \rightarrow ((\sim q) \vee p)$

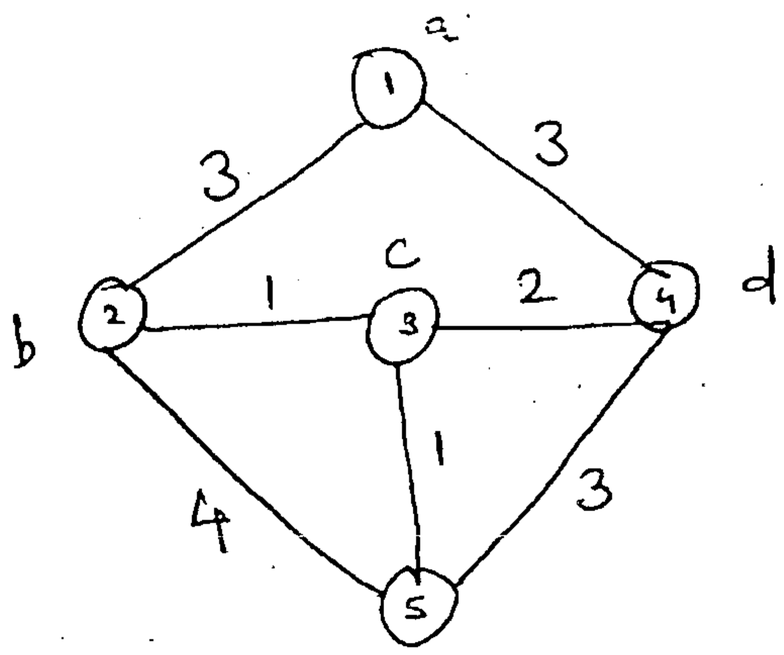
(iv) $(\sim q \vee (\sim p)) \leftrightarrow r$

Where P : I will study discrete structure

q : I will go to movie

r : I am in a good mood.

(b) Find the minimum spanning tree of the given graph by using Prim's algorithm. 6



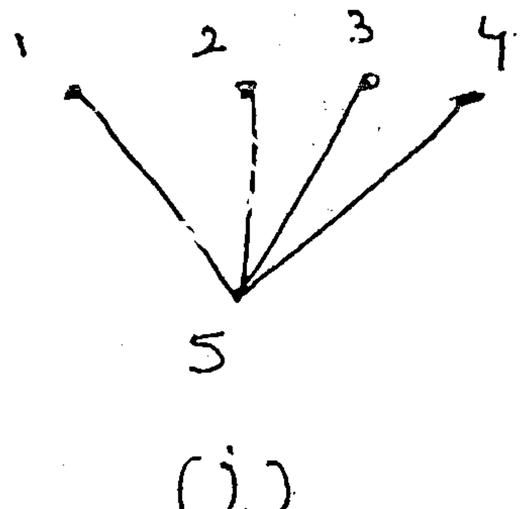
(c) State and prove left or right cancellation property for a group. 6

6. (a) In any ring (R, +, •) prove that 6

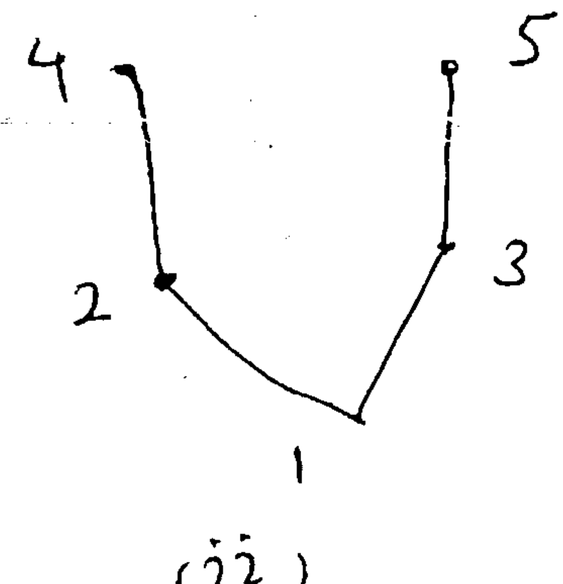
(i) The zero element z is unique

(ii) The additive inverse of each ring element is unique.

(b) Determine the matrix of the partial order whose Hasse Diagram is given below. 6



(i)



(ii)

(c) Let A = {1, 2, 3, 4} for the relation R whose materix is given below. Find the matrix of a transitive closure by warshall's Algorithm. 8

$$M_R = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 \end{bmatrix}$$

7. (a) Prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$. 6

(b) Show that in a bounded distributive lattice, if a complement exists, it is unique. 6

(c) A function $f : R - \left\{\frac{7}{3}\right\} \to R - \left\{\frac{4}{3}\right\}$ is defined as :— 8

$$f(x) = \frac{4x-5}{3x-7}$$

Prove that 'f' is bijective and find the rule for f^1.

S.E Com 2 (old) Computers

(C A

15/12/14

QP Code :12378

(OLD COURSE)

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

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

1. (a) Explain the Von Newmann architecture with the help of diagram. **10**
   (b) Explain the Floating point representation IEEE standard 754. **10**

2. (a) Explain design of control unit w.r.t. softwired and hardwired approach. **10**
   (b) Explain different Mapping techniques of Cache Memory. **10**

3. (a) Explain different Instruction Formats with suitable example. **10**
   (b) Explain the Flynn's classification of parallel processing. **10**

4. (a) Explain Bus Arbitration Schemes with diagram. **10**
   (b) Explain Booth's multiplicaiton algorithm with suitable example. **10**

5. (a) Explain the interleaved memory in detail. **10**
   (b) Explain restoring division method with suitable example. **10**

6. (a) Define following terms :— **10**
   (i) Computer organization
   (ii) Computer Architecture
   (iii) MDR
   (iv) PC
   (v) SP
   (b) Compare and explain static and dynamic data flow computers. **10**

7. Solve any **four** :— **20**
   (a) Comparision of RISC and CISC
   (b) RAID
   (c) DMA
   (d) Systolic processor
   (e) Page replacement Algorithm
   (f) Difference between SRAM and DRAM.
