

(Time: 3 Hrs)

Marks: 80

N.B. : 1. Question no. 1 is compulsory.

2. Solve any Three questions out of remaining Five questions.

- Q1 a) Explain the terms total participation and partial participation with example. (5)  
 b) List four significant differences between file processing and database management system. (5)  
 c) Explain the steps in query processing. (5)  
 d) List all functional dependencies satisfied by the relation. (5)

a	b	c
a1	b1	c1
a1	b1	c2
a2	b1	c1
a2	b1	c3

- Q2 a) Construct an E-R diagram for a car-insurance company that has a set of customers each of whom owns one or more cars. Each car has associated with it zero to any number of recorded accidents. (8)  
 b) We can convert any entity set to a strong entity set by simply adding appropriate attributes. (12)  
 Why then, do we have weak entity sets?

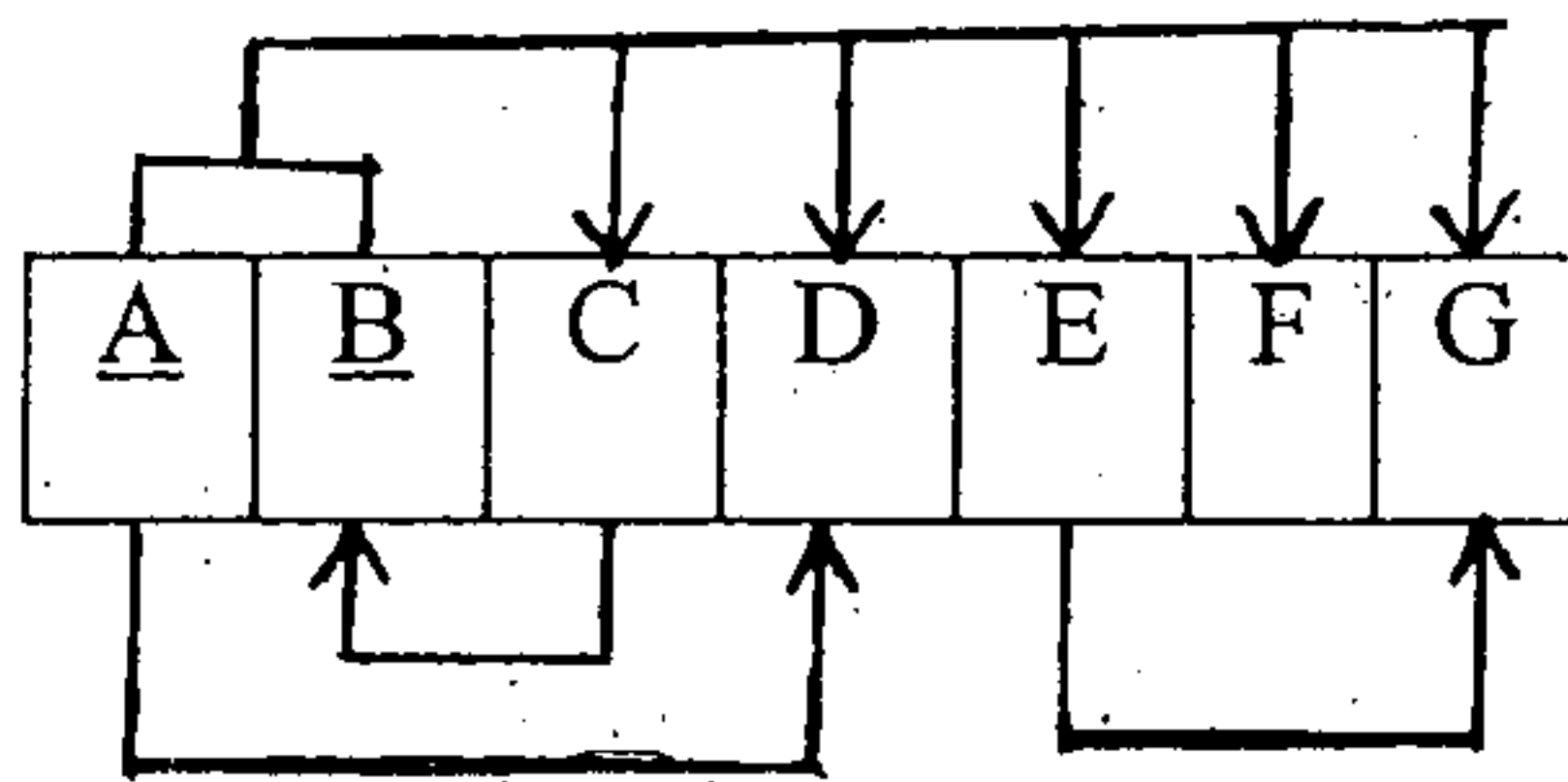
- Q3 a) Consider the following employee database (10)  
 Employee (empname,street,city,date of join)  
 Works (empname,company-name,salary)  
 Company (company-name,city)  
 Manages (empname,manager-name)

Write SQL queries for the following statements :-

- Find all employees who joined in the month of October.
- Modify the database so that 'Peter' now lives in 'Newton'.
- List all employees who live in the same cities as their managers.
- Find all employees who earn more than average salary of all employees of their company.
- Give all employees of XYZ corporation a 15 percent raise.

- b) Draw and Explain Database system structure. (10)

- Q4 a) Explain conflict and view serializability. (10)  
 b) What is the view in SQL, how it is defined? Discuss the problem that may arise when we attempt to update a view. How views are implemented? (10)
- Q5 a) Consider a dependency diagram of relation R and normalize it up to 3<sup>rd</sup> Normal form. (10)



- b) Compare the shadow paging recovery scheme with the log-based recovery schemes in terms of ease of implementation and overhead cost. (10)
- Q6 a) Explain the following relational algebra operations with proper examples. (10)  
 i) Set intersection  
 ii) Natural Join  
 iii) Division  
 iv) Generalized Projection
- b) Explain time stamp ordering protocol and Thomas Write rule. (10)

SE Sem. III | I.T.  
(CBSGS)

Analog & digital  
circuits. 01/06/15

**Q.P. Code : 4929**

**(3 Hours)**

**[Total Marks : 80**

- N.B. (1) Q.No.1 is compulsory  
(2) Attempt any three out of remaining questions.  
(3) Assume suitable data wherever required but justify them.  
(4) Draw appropriate waveforms wherever required.

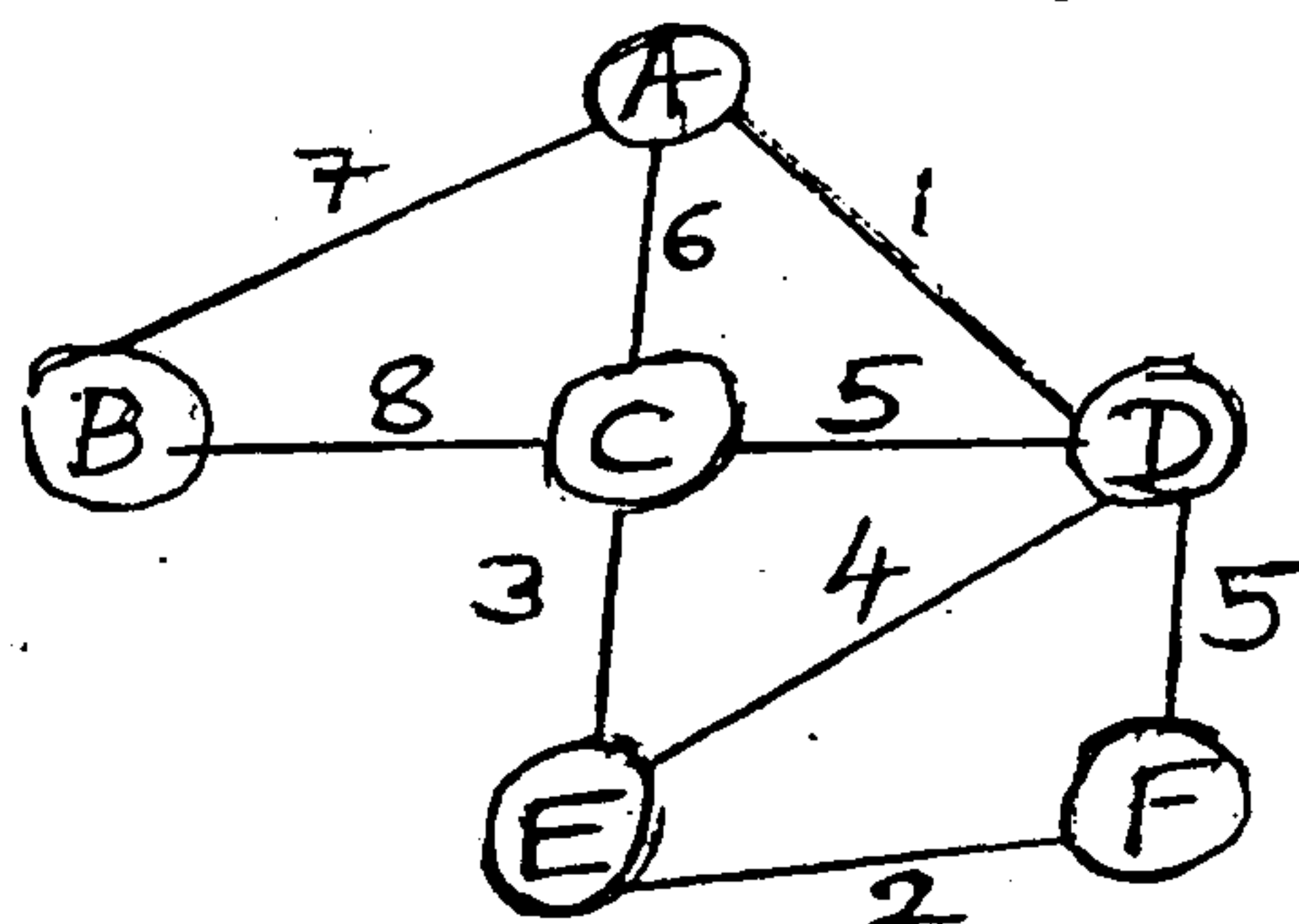
- Q.1. (a) Convert D Flip-Flop to T Flip-Flop. (04)  
(b) Draw the Truth Table and excitation Table for S-R Flip-Flop. (04)  
(c) Explain the working of LCD. (04)  
(d) Convert the following octal numbers to binary, decimal and hexadecimal number.  
(i)  $(6673)_8$  (ii)  $(7466)_8$  (04)  
(e) Compare BJT with JFET. (04)
- Q.2. (a) Draw the Truth Table for Full adder and realize using 3:8 Decoder (10)  
(b) Explain the working of Astable Multivibrator using IC- 555. (10)
- Q.3. (a) Explain in brief different biasing circuits for BJT (10)  
(b) Design a Modulo 5 ripple up counter and draw the waveforms for the same. (10)
- Q.4. (a) Realize the following expression using only one 8:1 MUX and few Logic gates.  
$$F(A,B,C,D) = \sum m(0, 3, 6, 8, 11, 13, 15)$$
 (10)  
(b) Explain Differential amplifier and elaborate any one method to improve CMRR. (10)
- Q.5. (a) Design a synchronous counter which goes through following states using J-K Flip-Flop.  
0-2-4-6-0 (10)  
(b) Write a note on Shift Register. (10)
- Q.6. Write short notes on the following. (20)  
(a) Universal Gates  
(b) 4-bit Binary to gray code converter  
(c) Inverting and Non-inverting operational amplifier.

(3 Hours)

[ Total Marks : 80

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

1. (a) Explain Asymptotic Notations. 3  
 (b) What is linked list? State the advantages of linked list. 3  
 (c) Define Double Ended queue. List the variants of Double ended queue. 3  
 (d) Define Graph. list its types with example. 3  
 (e) State the properties of Red Black Tree. 3  
 (f) Explain with example. 3  
     (i) Degree of tree   (ii) Height of tree  
 (g) Distinguish between linear data structure and non linear data structure. 2
2. (a) Write a program to implement STACK ADT using array. 10  
 (b) Write an algorithm to implement Quick sort. Explain with an example. 10
3. (a) Define binary search tree. Write algorithm to implement insertion and deletion operation. 10  
 (b) Give an INFIX expression and write a program to convert it in POSTFIX expression. 10
4. (a) Write a program to sort an array using insertion sort algorithm.  
 (b) What is AVL tree? Construct AVL tree using following sequence of data : 10  
 16, 27, 9, 11, 36, 54, 81, 63, 72 10
5. (a) Find the minimum spanning tree for the given graph using Kruskal's algorithm. 10  
 Also find its cost with all intermediate steps.



- (b) Write functions to implement insert () and traverse () of singly linked list. 10
6. a) Write algorithm to traverse a graph using: 10  
     (i) Breadth First Search   (ii) Depth First Search  
 (b) What is priority queue? Give implementation of it. 10



Q.P. Code : 4922

(3 Hours)

[ Total Marks : 80

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

1. Solve any four : 20
  - (a) What is convolution of signals ?
  - (b) Explain noise factor ?
  - (c) Define selectivity ?
  - (d) What is Intersymbol Interference ?
  - (e) What is Bit rate and Baud rate ?
  
2. (a) Explain digital communication system in details ? 6
- (b) What are types of Internal Noise ? 6
- (c) What is mean by signal to noise ratio ? Discuss the importance of SNR in radio receiver ? 8
  
3. (a) Obtain the fourier transform of a sinewave having frequency of  $f_0$  and peak amplitude of unity. Also plot its frequency spectrum ? 10
- (b) A sinusoidal carrier has amplitude of 20V and frequency 30 KHz. It is amplitude modulated by sinusoidal voltage of amplitude 3V and frequency 2KHz. Modulated voltage is developed across a  $50\Omega$  resistance.
  - (i) Write the equation for modulated wave
  - (ii) Plot the modulated wave showing maxima and minima of waveform
  - (iii) Determine the modulation Index
  - (iv) Draw the spectrum of modulated wave ? 10
  
4. (a) Explain generation of FM by Armstrong method ? 10
- (b) What is pulse position modulation (PPM) ? Explain modulation and demodulation technique used for ppm ? 10
  
5. (a) A Band pass signal has a spectral range that extends from 30 KHz to 75 KHz. Find the sampling frequency ? 10
- (b) Explain in detail generation of any method used in AM ? 20
  
6. Write short notes on (any four) :
  - (a) Friiss Formula
  - (b) Noise Bandwidth
  - (c) Balanced Modulator
  - (d) Pre-emphasis and De-emphasis
  - (e) Ratio Detector

(Comp & IT) CBCS  
Sem III OOPM

11/6/2015

Q.P. Code : 4842

( 3 Hours)

[ Total Marks : 80

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

[TURN OVER

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.
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Q.P. Code : 4827

(3 Hours)

[ Total Marks : 80

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

Q1a Find Laplace Transform of  $\frac{\sin t}{t}$  [20]

b Prove that  $f(z) = \sinh z$  is analytic and find its derivative.

c Find Fourier Series for  $f(x) = 9 - x^2$  over  $(-3, 3)$

d Find  $Z\{f(k) * g(k)\}$  if  $f(k) = \frac{1}{3^k}$ ,  $g(k) = \frac{1}{5^k}$

Q2 a Prove that  $\vec{F} = ye^{xy} \cos z i + xe^{xy} \cos z j - e^{xy} \sin z k$  is irrotational. Find Scalar Potential for  $\vec{F}$

Hence evaluate  $\int_C \vec{F} \cdot d\vec{r}$  along the curve  $C$  joining the points  $(0, 0, 0)$  and  $(-1, 2, \pi)$  [6]

b Find the Fourier series for  $f(x) = \frac{\pi - x}{2}$ ;  $0 \leq x \leq 2\pi$ . [6]

c Find Inverse Laplace Transform of i)  $\frac{s+29}{(s+4)(s^2+9)}$  ii)  $\frac{e^{-2s}}{s^2+8s+25}$  [8]

Q3 a Find the Analytic function  $f(z) = u + iv$  if  $u + v = \frac{x}{x^2 + y^2}$  [6]

b Find Inverse Z transform of  $\frac{1}{(z-1/2)(z-1/3)}$ ,  $1/3 < |z| < 1/2$  [6]

c Solve the Differential Equation  $\frac{d^2 y}{dt^2} + y = t$ ,  $y(0) = 1$ ,  $y'(0) = 0$ , using Laplace Transform [8]

Q4 a Find the Orthogonal Trajectory of  $3x^2y - y^3 = k$  [6]

b Using Greens theorem evaluate  $\int_C (xy + y^2) dx + x^2 dy$ ,  $C$  is closed path formed by  $y = x$ ,  $y = x^2$  [6]

c Find Fourier Integral of  $f(x) = \begin{cases} \sin x & 0 \leq x \leq \pi \\ 0 & x > \pi \end{cases}$ . Hence show that  $\int_0^\infty \frac{\cos(\lambda\pi/2)}{1-\lambda^2} d\lambda = \frac{\pi}{2}$  [8]



**Q.P. Code : 4827**

2

Q5 a Find Inverse Laplace Transform using Convolution theorem  $\frac{s}{(s^4 + 8s^2 + 16)}$  [6]

b Find the Bilinear Transformation that maps the points  $z = 1, i, -1$  into  $w = i, 0, -i$  [6]

c Evaluate  $\int_C \vec{F} \cdot d\vec{r}$  where C is the boundary of the plane  $2x + y + z = 2$  cut off by co-ordinate planes and  $\vec{F} = (x + y)i + (y + z)j - xk$ . [8]

Q6 a Find the Directional derivative of  $\phi = x^2 + y^2 + z^2$  in the direction of the line  $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$  at  $(1, 2, 3)$  [6]

b Find Complex Form of Fourier Series for  $e^{2x}$ ;  $0 < x < 2$  [6]

c Find Half Range Cosine Series for  $f(x) = \begin{cases} kx & ; 0 \leq x \leq 1/2 \\ k(1-x) & ; 1/2 \leq x \leq 1 \end{cases}$ , hence find  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$  [8]