

USN 

--	--	--	--	--	--	--	--	--	--

10MAT41

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017  
Engineering Mathematics - IV**

Time: 3 hrs.

Max. Marks:100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART - A**

- 1
  - a. Using Taylor series method, solve  $\frac{dy}{dx} = 2y + 3e^x$ ,  $y(0) = 0$  at  $x = 0.2$ . (06 Marks)
  - b. Using Runge - Kutta method of fourth order solve for  $y(0.1)$ ,  $y(0.2)$  given that  $\frac{dy}{dx} = y(x + y)$ ,  $y(0) = 1$ . (07 Marks)
  - c. Given  $\frac{dy}{dx} = x^2(1 + y)$  and  $y(1) = 1$ ,  $y(1.1) = 1.233$ ,  $y(1.2) = 1.548$ ,  $y(1.3) = 1.979$ , evaluate  $y(1.4)$  by Milne's Predictor - Corrector method. (07 Marks)
  
- 2
  - a. Approximate  $y$  and  $z$  at  $x = 0.1$ , using Picard's method for the solution of the equations  $\frac{dy}{dx} = z$ ,  $\frac{dz}{dx} = x^3(y + z)$ , given that  $y(0) = 1$  and  $z(0) = \frac{1}{2}$ . (06 Marks)
  - b. Using Runge - Kutta fourth order method to solve  $y'' = xy' - y$ ,  $y(0) = 3$ ,  $y'(0) = 0$ , find  $y$  and  $z$  at  $x = 0.1$ . (07 Marks)
  - c. Apply Milne's method to compute  $y(0.4)$  given that  $y'' + xy' + y = 0$  and the values  $y(0) = 1$ ,  $y(0.1) = 0.995$ ,  $y(0.2) = 0.9801$ ,  $y(0.3) = 0.956$ ,  $y'(0) = 0$ ,  $y'(0.1) = -0.0995$ ,  $y'(0.2) = -0.196$ ,  $y'(0.3) = -0.2867$ . (07 Marks)
  
- 3
  - a. Prove that the C - R equations in polar form. (06 Marks)
  - b. Show that  $f(z) = z^n$ , where  $n$  is a positive integer is analytic and hence find its derivative. (07 Marks)
  - c. If  $\phi + i\Psi$  represents the complex potential of an electrostatic field where  $\Psi = x^2 - y^2 + \frac{x}{x^2 + y^2}$ , find  $\phi$ . (07 Marks)
  
- 4
  - a. Find the Bilinear transformation which maps the points  $1, i - 1$  into  $0, 1, \infty$ . (06 Marks)
  - b. State and prove the Cauchy's integral formula. (07 Marks)
  - c. Evaluate  $\int_c \frac{e^{2z}}{(z+1)(z-2)} dz$ , where  $c: |z| = 3$ . (07 Marks)

**PART - B**

- 5
  - a. Find the solution of the Laplace's equation in cylindrical system leading to Bessel's differential equation. (06 Marks)
  - b. Derive Rodrigue's formula  $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n$ . (07 Marks)
  - c. Express  $f(x) = x^4 + 3x^3 - x^2 + 5x - 2$  in terms Legendre polynomials. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 6 a. Define the Empirical and Axiomatic definition of probability and give an example of each. (06 Marks)
- b. Of the cigarette smoking population 70% are men and 30% are women, 10% of these men and 20% of these women smoke wills. What is the probability that person seen smoking a wills will be a man? (07 Marks)
- c. The chance that a doctor will diagnose a disease correctly is 60%. The chance that a patient will die after correct diagnose is 40% and the chance of death by wrong diagnosis is 70%. If a patient dies, what is the chance that his disease was correctly diagnosed? (07 Marks)
- 7 a. Derive the mean and variance of Binomial distribution. (06 Marks)
- b. If  $x$  is an exponential distribution with mean 4, evaluate i)  $P(0 < x < 1)$  ii)  $P(x > 2)$  and iii)  $P(-\infty < x < 10)$ . (07 Marks)
- c. The marks of 1000 students in an examination follows a normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be i) less than 65 ii) More than 75 and iii) between 65 and 75. (07 Marks)
- 8 a. Define the following terms :  
i) Type I – error and Type II – error ii) Level of significance. (06 Marks)
- b. A certain stimulus administered to each of the 12 patients resulted in the following :  
Change in blood pressure 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4, can it be concluded that the stimulus will increase the blood pressure? (t. 05 for 11 d.f = 2.201). (07 Marks)
- c. The theory predicts the proportion of beans in the four groups  $G_1, G_2, G_3, G_4$  should be in the ratio 9:3:3:1. In an experiment with 1600 beans the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory? (at 5% LOS for 3 d.f = 7.815). (07 Marks)

\*\*\*\*\*

--	--	--	--	--	--	--	--	--	--

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Graph Theory and Combinatorics**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting at least TWO questions from each part.**

**PART - A**

- 1 a. Define a graph and degree of a vertex of a graph. Prove that in every graph the number of vertices of odd degree is even. (06 Marks)
- b. Define self-complementary graph. How many edges must  $G$  have, if  $G$  is a self-complementary graph? Give one example for each of the self complementary graph on 4 vertices and 5 vertices. (07 Marks)
- c. Show that a connected graph with exactly 2 vertices of odd degree has an Euler Trail. Find the Euler circuit in the graph shown below. (07 Marks)

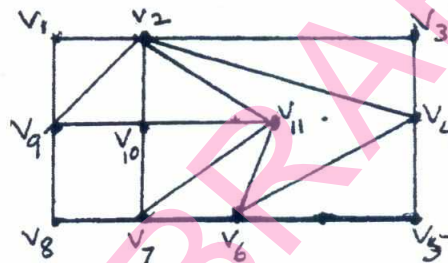


Fig.Q.1(c)

- 2 a. State Euler's fundamental theorem on planar graphs. Verify the same for the following graph. Also construct the dual of the same graph. Fig.Q.2(a) (06 Marks)

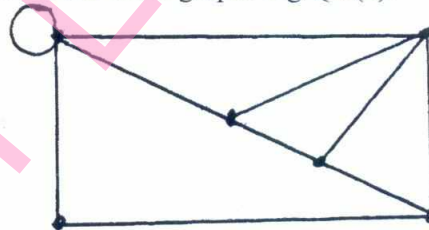


Fig.Q.2(a)

- b. Check the planarity of the following graph by the method of elementary reduction Fig.Q.2(b). (07 Marks)

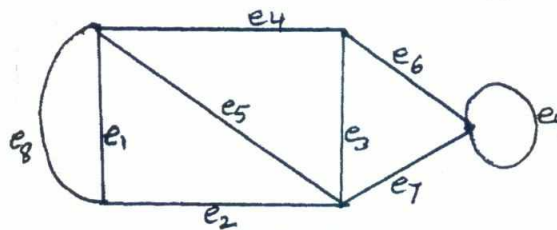


Fig.Q.2(b)

- c. Define chromatic number and chromatic polynomial of a graph. Find the chromatic polynomial for the cycle  $C_4$ . What is its chromatic number? (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 3 a. Define a tree and a forest. Prove that a tree with two or more vertices contains at least 2 leaves. Further, show that if a tree has exactly two pendent vertices, the degree of every non-pendant vertex is two. (06 Marks)
- b. Show that a Hamilton path is a spanning tree. Draw all the spanning trees of the graph Fig.Q.3(b). (06 Marks)

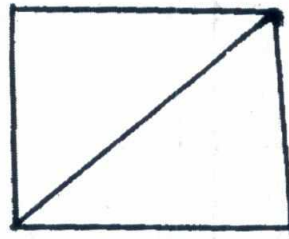


Fig.Q.3(b)

- c. Construct an optimal prefix code for the letters of the word 'ENGINEERING'. Hence deduce the code for this word. (08 Marks)
- 4 a. Apply Prim's algorithm to find a minimal spanning tree for the graph Fig.Q.4(a). (07 Marks)

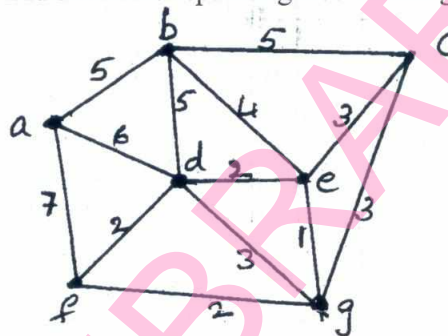


Fig.Q.4(a)

- b. Apply Dijkstra's algorithm to the weighted digraph, to find the shortest distance from vertex 1 to each of the other vertices Fig.Q.4(b). (08 Marks)

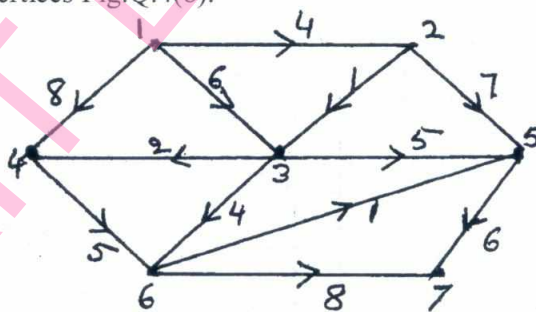


Fig.Q.4(b)

- c. Define matching. Five students  $s_1, s_2, s_3, s_4, s_5$  are members of 3 committees  $c_1, c_2, c_3$ . The committee  $c_1$  has  $s_4$  and  $s_3$  as members, the committee  $c_2$  has  $s_1, s_3, s_5$  as members and the committee  $c_3$  has  $s_2$  and  $s_5$  as members. Each committee is to select a student representative. Can a selection be made in such a way that each committee has a distinct representative? (05 Marks)

**PART – B**

- 5 a. How many arrangements are there for all the letters in the word 'SOCIOLOGICAL'? In how many of these arrangements i) A and G are adjacent? ii) All the vowels are adjacent? (07 Marks)
- b. Find the coefficient of i)  $x^{12}$  in the expansion of  $x^3(1 - 2x)^{10}$  and ii)  $x^2y^2z^3$  in the expansion of  $(3x - 2y - 4z)^7$ . (06 Marks)
- c. Define Catalan number. Using the moves R:  $(x, y) \rightarrow (x + 1, y)$  and u:  $(x, y) \rightarrow (x, y + 1)$  find in how many ways can one go,  
 i) From  $(0, 0)$  to  $(6, 6)$  and not rise above the line  $y = x$ ?  
 ii) From  $(2, 1)$  to  $(7, 6)$  and not rise above the line  $y = x - 1$ ? (07 Marks)
- 6 a. Find the number of non-negative integer solutions of the equation  $x_1 + x_2 + x_3 + x_4 = 18$  under the condition  $x_i \leq 7$  for  $i = 1, 2, 3, 4$ . (07 Marks)
- b. There are  $n$  pairs of children's gloves in a box. Each pair is of a different colour. Suppose the right gloves are distributed at random to  $n$  children and there after the left gloves are also distributed to them at random. Find the probability that,  
 i) No child gets a matching pair.  
 ii) Every child gets a matching pair.  
 iii) Exactly one child gets a matching pair. (06 Marks)
- c. Find the rook polynomial for the board shown below (shaded part). (07 Marks)

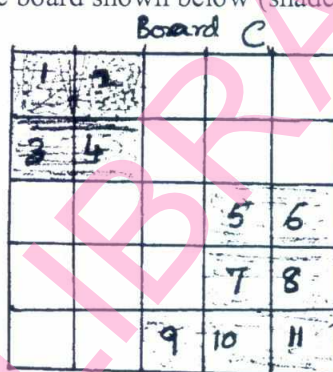


Fig.Q.6(c).

- 7 a. Using generating function, derive the formula  $\sum_{k=0}^n k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$ . (07 Marks)
- b. In how many ways can 12 oranges be distributed among 3 children A, B, C so that A gets at least 4, B and C gets at least 2, but C gets no more than 5? (07 Marks)
- c. A company appoints 11 software engineers, each of whom is to be assigned to one of four offices of the company. Each office should get at least one of these engineers. In how many ways can these assignments be made? (06 Marks)
- 8 a. Find the recurrence relation and the initial condition for the sequence 0, 2, 6, 12, 20, 30, 42, ... Hence find the general term of the sequence. (06 Marks)
- b. Solve the recurrence relation  $a_n + a_{n-1} - 6a_{n-2} = 0$  for  $n \geq 2$  given that  $a_0 = -1$  and  $a_1 = 8$ . (07 Marks)
- c. Find the generating function for the recurrence relation,  $a_{n+2} - 5a_{n+1} + 6a_n = 2, n \geq 0$  and  $a_0 = 3, a_1 = 7$ . Hence solve it. (07 Marks)

\*\*\*\*\*

--	--	--	--	--	--	--	--	--	--

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Design & Analysis of Algorithms**

Time: 3 hrs.

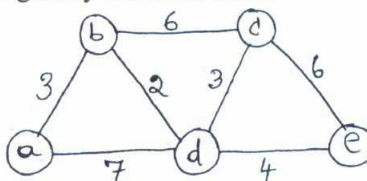
Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. Define three asymptotic notations and express the following assertions using three asymptotic notations with proof from its definition  
 i)  $n(n-1)/2$     ii)  $6 \cdot 2^n + n^2$     iii)  $100n + 5$ . (06 Marks)  
 b. Give general plan of analyzing recursive algorithm. Mathematically analyze the tower of Hanoi problem and find its complexity. (08 Marks)  
 c. Give any two brute force sorting algorithms to sort the given set of integer and find its complexities. (06 Marks)
- 2 a. Give the general form of divide and conquer recurrence relation and explain how you can solve it using Master's theorem. (06 Marks)  
 b. Give a suitable sorting algorithm that uses divide and conquer techniques which divides problem size by considering values in the list. Analyze it for best and worst case efficiencies. (08 Marks)  
 c. Give recursive binary search algorithm and write binary decision tree for the following  $n = 14$  elements  $(-15, -6, 0, 7, 9, 23, 54, 82, 101, 112, 125, 131, 142, 151)$ . (06 Marks)
- 3 a. Give the control abstraction for subset paradigm using greedy method. Solve the job sequencing with deadline problem using greedy method for the given data  
 $N = 7, P = \{3, 5, 20, 18, 1, 6, 30\}$  are profits and  
 $D = \{1, 3, 4, 3, 5, 1, 2\}$  are deadline respectively. (06 Marks)  
 b. Find minimum cost spanning tree for a graph  $G(6, 10)$  with vertices named as a, b, c, d, e, f and edges  $ab = 3, bc = 1, af = 5, ae = 6, ed = 8, fe = 2, fd = 5, cd = 6, cf = 4$  and  $bf = 4$  using prim's algorithm and justify your answer by solving the problem using Kruskal's algorithm showing results in each stages. (08 Marks)  
 c. Find the shortest path from source a to all other vertices in the graph shown in Fig Q3(c). Using greedy method. Give the greedy criterion used. (06 Marks)

Fig Q3 (c)

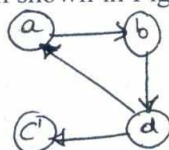


- 4 a. Design the recurrence to solve all pairs shortest path algorithm and give the all pairs shortest path algorithm. (08 Marks)  
 b. Give the recurrence used to solve knapsack problem using dynamic programming and explain in brief the same. Solve the following Knapsack problem using dynamic programming. Capacity  $W = 5$  (08 Marks)

Item	1	2	3	4
Weight	2	1	3	2
Value	12	10	20	15

- c. Find the transitive closure for the graph shown in Fig 4 (c) using dynamic programming

Fig Q4(c)



(04 Marks)

**PART – B**

- 5 a. Sort the list 75, 65, 55, 45, 35, 25 to arrange in ascending order using decrease and conquer technique showing traces of its working and find its complexity. Also write the algorithm used. (06 Marks)
- b. Give a suitable algorithm for finding a minimum edge – path between two given vertices in any given graph. Apply that algorithm to the graph shown in Fig Q5(b) showing the tree that identifies the minimum edge path from a to g. (06 Marks)

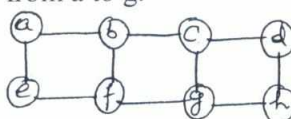


Fig Q5(b)

- c. Show the steps of searching for a pattern BAOBAB in a Text: BESS – KNEW – ABOUT – BAOBAB using input enhancement technique that uses single shift table. Give the pseudo code of the algorithm and find its worst case complexity. (08 Marks)
- 6 a. What do you mean by lower bound arguments? Listout four methods of obtaining lower bounds and explain them in brief. (08 Marks)
- b. What is a decision tree? Write a 3 – element insertion sort decision tree and find the average number of comparison. (06 Marks)
- c. Apply four iterations of Newton method to compute  $\sqrt{2}$  and estimate the absolute and relative errors of the computations. (06 Marks)
- 7 a. Explain backtracking concept and apply it to solve subset sum problem for  $S = \{6, 5, 3, 7\}$  and  $d = 15$ . (06 Marks)
- b. How the branch and bound algorithm is different from backtracking? Solve the following instance of Knapsack problem by the branch and bound method. Given Knapsack capacity = 10. (08 Marks)

Item	1	2	3	4
Weight	4	7	5	3
Value	40	42	25	12

- c. Give the nearest neighbor algorithm to solve TSP and apply that algorithm for the graph shown in Fig Q7(c), with starting vertex a and also calculate accuracy ratio of approximation. (06 Marks)

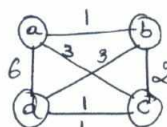


Fig Q7(c)

- 8 a. What is super linear speed up? Obtain maximum speed up when  $P = 10$  and for  $f = 0.5, 0.1, 0.01$ . (04 Marks)
- b. What are the different ways of solving read and write conflict? Define all that conflicts. (06 Marks)
- c. Let input to the prefix computation problem be 5, 12, 8, 6, 3, 9, 11, 12, 1, 5, 6, 7, 10, 4, 3, 5 and let  $\oplus$  stand for addition. Solve problem using work optimal algorithm. (10 Marks)

\* \* \* \* \*

USN

--	--	--	--	--	--	--	--	--	--

10CS44

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**UNIX and Shell Programming**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. Explain the salient features of UNIX operating system. (07 Marks)
- b. With neat diagram explain the architecture of UNIX clearly bring out the division of labor between Kernel and shell. (08 Marks)
- c. Explain the following commands with examples.  
i) cat ii) pwd iii) who iv) tty v) bc (05 Marks)
- 2 a. What is file permission? What are the different ways of setting file permission? Explain. (07 Marks)
- b. A file's current permission are rw – r – xr – – specify the chmod expression required to change them for the following. Using both relative and absolute methods of assigning permissions.  
i) –w –r – –r – – ii) r – –r – – – – – iii) rwxrwxrwx iv) – – – – – (08 Marks)
- c. Explain the three modes of Vi editor with diagram. (05 Marks)
- 3 a. What is shell process? What are the different phases in the creation of process? (07 Marks)
- b. Explain what wild – card patterns match :  
[A – Z]????\* ii) \*[0 – 9]\* iii) \*![0 – 9] iv) \*.\*[!S] [!h] (08 Marks)
- c. What is process status? Explain ps command with options. (05 Marks)
- 4 a. Differentiate between hard link and soft link in UNIX with examples. (06 Marks)
- b. Explain the following filters with examples:  
i) tail ii) tr iii) pr iv) cut. (08 Marks)
- c. Explain the following environment variables with examples:  
i) LOGNAME ii) PATH iii) HOME. (06 Marks)

**PART – B**

- 5 a. With the example, explain the grep command any five options. (10 Marks)
- b. What is sed? Explain the difference between line addressing and context addressing in sed. (10 Marks)
- 6 a. What is shell programming? Write a shell program in order to perform the following tasks:  
i) Display current login users ii) print current directory iii) Process status. (08 Marks)
- b. Explain the shell features of while and for loop with examples. (08 Marks)
- c. Explain trap in shell scripts with suitable example. (04 Marks)
- 7 a. Explain the following Built in variables of awk with examples.  
i) FS ii) NF iii) FILENAME iv) NR. (08 Marks)
- b. With suitable examples, explain if and while statement in awk. (06 Marks)
- c. Explain the following built-in functions of awk with examples :  
i) Substr ii) length iii) index. (06 Marks)
- 8 a. Explain the string handling functions of perl with examples. (08 Marks)
- b. Explain the following with respect to PERL with examples:  
i) For each looping construct ii) Join. (06 Marks)
- c. Write a PERL program to print numbers that are accepted from the keyboard using while. (06 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



USN

--	--	--	--	--	--	--	--	--	--

10CS45

### Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017

### Microprocessors

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting at least TWO questions from each part.**

#### PART – A

- 1 a. Discuss the development of Intel 86 family of microprocessors. Briefly indicate the additional features introduced at each stage of development from 8086 to Pentium IV. (06 Marks)
- b. Explain with a neat sketch the memory map of a personal computer system. (06 Marks)
- c. With a neat sketch explain architecture of 8086. (08 Marks)
- 2 a. Discuss the following Addressing modes of 8086 with example. (06 Marks)
  - i) Register indirect
  - ii) Immediate
  - iii) Base plus index.
- b. What are the different program memory addressing modes? Explain with example. (06 Marks)
- c. Calculate the physical address for the following instructions. Assume DS = 1000H, SS = 7000H, ES = 4000H, BP = 0100H, SI = 0020H, DI = 0200H, BX = 0700H, Values = 0500H. (08 Marks)
  - i) MOV AX, [BX] [SI]
  - ii) ADD AL, [BP + 40H]
  - iii) MOV CX, Values [BX] [DI]
  - iv) MOV ES : [1000H], 20H.
- 3 a. Explain the following assembler directives with example. (10 Marks)
  - i) ASSUME
  - ii) PUBLIC AND EXTRN
  - iii) MACRO AND ENDM
  - iv) MODEL.
- b. Write the instruction template (format) for the following instructions. (06 Marks)
  - i) MOV AX, DX
  - ii) MOV DX, [BP] 0200H
  - iii) MOV AL, [BX] [DI]
- c. What is meant by segment override prefix? Explain with an illustration. (04 Marks)
- 4 a. Explain the working of following 8086 instructions. (08 Marks)
  - i) DAA
  - ii) IMUL
  - iii) REPE CMPSB
  - iv) LOOP.
- b. Differentiate between 'short', 'near' and 'far' jump instruction with example. (06 Marks)
- c. Explain with an example, how parameters can be passed to subroutine, using stack. (06 Marks)

#### PART – B

- 5 a. Differentiate between 'Macros' and Procedures' with an example for each. (08 Marks)
- b. Write an ALP to compute the factorial of a given 8-bit number using recursion. (06 Marks)
- c. Write an ALP to sort a given set of N numbers in ascending order using bubble sort. (06 Marks)
- 6 a. Illustrate with a neat diagram, the working of 8086 in minimum mode. (10 Marks)
- b. Explain the memory read bus cycle of 8086 in minimum mode with a neat diagram. (10 Marks)
- 7 a. Interface four 8KB RAMs starting with an address of 40000H using 3:8 Decoder. Clearly mention the decoding logic and memory map. (10 Marks)
- b. Differentiate between memory mapped I/O and I/O mapped I/O. (06 Marks)
- c. Write a note on Interrupt driven I/O. (04 Marks)
- 8 a. With a neat sketch explain the functioning of 8255 PPI. (10 Marks)
- b. Discuss the control word format of 8255 PPI with a sketch. (10 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

--	--	--	--	--	--	--	--	--	--

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Computer Organization**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
atleast TWO questions from each part.**

**PART – A**

- 1
  - a. What is pipelining? How does it improve the performance of the computer? (08 Marks)
  - b. Compare CISC versus RISC processors. (04 Marks)
  - c. Explain clearly SPEC rating and its significance. (08 Marks)
- 2
  - a. What is the need of an addressing mode? Explain three addressing modes with examples. (08 Marks)
  - b. Convert the following numbers to signed, 2's complement binary number and add them.  
(i) 7 and -5      (ii) -10 and -13 (04 Marks)
  - c. What is stack frames? Explain. (04 Marks)
  - d. Explain the shift and rotate operations with example. (04 Marks)
- 3
  - a. In modern computers, why interrupts are required? Support your claim with a suitable example. (04 Marks)
  - b. Showing the possible register configuration in DMA interface, explain direct memory access. (08 Marks)
  - c. With a neat sketch, explain the individual input and output interface circuits. Also elicit their salient features. (08 Marks)
- 4
  - a. Write a note on PCI configuration and explain with neat figure the single processor system configurations. (08 Marks)
  - b. Explain the different phases in the operations of SCSI bus speed in detail. (06 Marks)
  - c. Explain the following :  
(i) USB addressing      (ii) USB protocols. (06 Marks)

**PART – B**

- 5
  - a. Describe SDRAM and DDR SDRAM operations for data transfer between main memory and cache memory systems. (08 Marks)
  - b. Explain any one cache mapping function. (06 Marks)
  - c. Consider a two level cache with access times of 5 ns and 80 ns respectively. If the hit rates are 95% and 75% respectively in the two caches and the memory access time is 250 ns, what is the average access time? (04 Marks)
  - d. Calculate the effective address time if average page fault service time of 20 milliseconds and a memory access time of 80 nano seconds. (Assume the probability of a page fault as 10%). (02 Marks)
- 6
  - a. Explain how a 16-bit carry look ahead adder can be built from a 4-bit adder. (08 Marks)
  - b. Using the non storing division algorithm, perform the division of numbers 23 by 5 ( $23 \div 5$ ). (08 Marks)
  - c. Explain the IEEE standards for floating point number. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8=50$ , will be treated as malpractice.

- 7 a. Explain the process of fetching a word from memory using timing diagram of memory read operations, with an example. (08 Marks)
- b. Bring out any four difference between hardwired and microprogrammed control. (04 Marks)
- c. With a neat diagram, explain the microinstruction sequencing organization. (08 Marks)
- 8 a. Write a short note on power wall. (06 Marks)
- b. State and explain the Amdhal's law and compute the speed up gained for the following. Suppose that the new CPU is 10 times faster in computing floating point calculations and old CPU is busy with floating point calculations 40% of the time. Calculate speed up gained by the new CPU. (08 Marks)
- c. With a neat block diagram bring out the characteristics of shared memory multiprocessors (SMPs). (06 Marks)

\* \* \* \* \*

SKIT LIBRARY

USN

--	--	--	--	--	--	--	--	--	--	--

MATDIP401

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Advanced Mathematics – II**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. Find the angle between any two diagonals of a cube. (06 Marks)
- b. The direction cosines of three mutually perpendicular lines are  $l_1, m_1, n_1$ ,  $l_2, m_2, n_2$  and  $l_3, m_3, n_3$ . Show that the line with direction cosines  $l_1 + l_2 + l_3$ ,  $m_1 + m_2 + m_3$ ,  $n_1 + n_2 + n_3$  is equally inclined to the above lines. (07 Marks)
- c. Find the equations of the plane passing through the points (1, 2, 3) (0, 1, 4) and (0, 0, 1). (07 Marks)
- 2 a. Derive the equation to the plane in the intercept form  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ . (06 Marks)
- b. Find the angle between the lines  $\frac{x-1}{1} = \frac{y-5}{0} = \frac{z+1}{2}$  and  $\frac{x+3}{3} = \frac{y}{5} = \frac{z-5}{2}$ . (07 Marks)
- c. Find the image of the point (1, 2, 3) in the line  $\frac{x+1}{2} = \frac{y-3}{3} = -z$ . (07 Marks)
- 3 a. Show that the position vectors of the vertices of a triangle  $2i - j + k$ ,  $i - 3j - 5k$ ,  $3i - 4j - 4k$  form a right angled triangle. (06 Marks)
- b. Find a vector of magnitude 12 units which is perpendicular to the vectors  $\vec{a} = 4i - j + 3k$  and  $\vec{b} = -2i + j - 2k$ . (07 Marks)
- c. Find  $\lambda$  so that the points A(-1, 4, -3), B(3, 2, -5), C(-3, 8, -5) and D(-3,  $\lambda$ , 1) are coplanar. (07 Marks)
- 4 a. Find the unit tangent vector of the space curve  $x = 1 + t^3$ ,  $y = 2t^3$ ,  $z = 2 - t^3$  at  $t = 1$ . (06 Marks)
- b. Find the angle between the tangents to the curve  $\vec{r} = \left(t - \frac{t^2}{2}\right)i + t^2j + \left(t + \frac{t^2}{2}\right)k$  at  $t = \pm 1$ . (07 Marks)
- c. A particle moves along the curve whose parametric equations are  $x = t - \frac{t^3}{3}$ ,  $y = t^2$  and  $z = t + \frac{t^3}{3}$ , where 't' is the time. Find the velocity and acceleration at any time 't'. Also find their magnitudes at  $t = 3$ . (07 Marks)
- 5 a. Find the angle between the surfaces  $x^2 + y^2 + z^2 = 9$  and  $x = z^2 + y^2 - 3$  at (2, -1, 2). (06 Marks)
- b. Find the constants a, b, c such that the vector,  $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$  is irrotational. (07 Marks)
- c. If  $\vec{A} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$  then find  $\text{div } \vec{A}$  and  $\text{curl } \vec{A}$ . (07 Marks)

- 6 a. Find the expression for  $L[\sin at]$ . (05 Marks)  
 b. Find  $L[t \sin at]$ . (05 Marks)  
 c. Find  $L\left[\frac{1-e^{at}}{t}\right]$ . (05 Marks)  
 d. Find  $L[e^t \cos^2 2t]$ . (05 Marks)
- 7 a. Find  $L^{-1}\left[\frac{s}{(s+2)(s^2+1)}\right]$ . (06 Marks)  
 b. Find  $L^{-1}\left[\frac{s+2}{s^2+2s+2}\right]$ . (07 Marks)  
 c. Find  $L^{-1}\left[\log\left[\frac{s^2+1}{s(s-1)}\right]\right]$ . (07 Marks)
- 8 a. Using Laplace transform solve:  
 $y'' - 2y' + y = e^{2t}$  with  $y(0) = 0$  and  $y'(0) = 1$ . (10 Marks)  
 b. Solve using Laplace transformation, method  $y'' + 2y' - 3y = \sin t$ ,  $y(0) = y'(0) = 0$ . (10 Marks)

\*\*\*\*\*