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06MAT41

Fourth Semester B.E. Degree Examination, December 2010
Engineering Mathematics – IV

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting at least TWO questions from each part.*
2. Any missing data may be suitably assumed.

PART – A

1 a. Given $\frac{dy}{dx} + y - x^2 = 0$, y(0) = 1, y(0.1) = 0.9052, y(0.2) = 0.8213. Find correct to four decimal places y(0.3) and y(0.4) using modified Euler's method. **(07 Marks)**

b. Apply Runge – Kutta method of order four, to compute y(2.0). Given $10\frac{dy}{dx} = x^2 + y^2$, y(0) = 1, taking h = 0.1. **(07 Marks)**

c. The following table gives the solution of $\frac{dy}{dx} = x - y^2$. Find the value of y at x = 0.8, using Milne's predictor and corrector formulae.

X	0	0.2	0.4	0.6
Y	0	0.02	0.07	0.17

(06 Marks)

2 a. Show that polar forms of Cauchy's Riemann equation are $\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial V}{\partial \theta}, \frac{\partial V}{\partial r} = -\frac{1}{r}\frac{\partial u}{\partial \theta}$. Deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0$. **(07 Marks)**

b. Determine the analytic function w = u + iυ if V = log $(x^2 + y^2)$ + x – 2y. **(07 Marks)**

c. Find the Bilinear transformation which maps the points z = 1, i, -1 into w = 0, 1, ∞. **(06 Marks)**

3 a. State and prove Cauchy's integral formula. **(07 Marks)**

b. Find the Laurent series of $\frac{3x^2 - 6z + 2}{z^3 - 3z^2 + 2z}$. i) 1 < | z | < 2 ii) | z | > 2. **(07 Marks)**

c. Evaluate $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$, where c is | z | = 3 using Cauchy's residue theorem. **(06 Marks)**

4 a. Solve the equation in series $\frac{d^2y}{dx^2} + x^2 y = 0$. **(07 Marks)**

b. Obtain the series solution of Bessel's differential equation in the form $y = AJ_n(x) + BJ_{-n}(x)$. **(07 Marks)**

c. If $x^3 + 2x^2 - x + 1 = aP_0(x) + bP_1(x) + cP_2(x) + dP_3(x)$, find the value of a, b, c, d. **(06 Marks)**

PART – B

5 a. Fit a curve of form $y = ab^x$ and hence estimate y when x = 8.

X	1	2	3	4	5	6	7
Y	87	97	113	129	202	195	193

(07 Marks)

b. If θ is the angle between the lines of regression then show that

$$\tan\theta = \frac{\sigma_x\sigma_y}{\sigma_x^2+\sigma_y^2}\left(\frac{1-r^2}{r}\right)$$ **(07 Marks)**

c. State and prove Baye's theorem. **(06 Marks)**

6 a. The pdf of a variate X is given by the following table :

X	0	1	2	3	4	5	6
P(x)	k	3k	5k	7k	9k	11k	13k

For what value of k, this represents a valid probability distribution?
Also find : i) $P(x \geq 5)$ ii) $P(3 < x \leq 6)$. **(07 Marks)**

b. Given that 2% of the fuses manufactured by a firm are defective, find by using Poisson distribution, the probability that a box containing 200 fuses has
i) No defective fuses ii) 3 or more defective fuses iii) At least one defective fuse. **(07 Marks)**

c. The marks of 100 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 iii) between 65 and 75. **(06 Marks)**

7 a. Explain the following terms :
i) Null hypothesis ii) Type I and type II error iii) Confidence limits. **(07 Marks)**

b. A sample of 100 days is taken from a coastal town of a certain district and of 10 of them are found to be very hot. What are the probable limits of the percentage of hot days in the district? **(07 Marks)**

c. A certain stimulus administrated 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? ($t_{0.05}$ for 11 df = 2.201). **(06 Marks)**

8 a. The joint probability distribution of two random variables x and y is as follows :

x \ y	-2	-1	4	6
1	0.1	0.2	0	0.3
2	0.2	0.1	0.1	0

Determine :
i) The marginal distribution of x and y ii) Co variance of x and y iii) Correlation of x and y. **(07 Marks)**

b. Verify that the matrix

$$A = \begin{bmatrix} 0 & 0 & 1 \\ \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ 0 & 1 & 0 \end{bmatrix}.$$

is a regular stochastic matrix. **(07 Marks)**

c. Explain:
i) Absorbing state of Markov chain ii) Transient state iii) Recurrent state. **(06 Marks)**

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06CS42

Fourth Semester B.E. Degree Examination, December 2010
Graph Theory and Combinatories

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, choosing at least two questions from each part.***

PART – A

1 a. Define: i) Connected graph ii) Spanning subgraph, and iii) Complement of a graph. Give one example for each. **(06 Marks)**

b. Explain, with an example, graph isomorphism. Show that in a graph G, the number of odd degree vertices is even. **(07 Marks)**

c. Write a note on "Konigsberg-bridge problem". **(07 Marks)**

2 a. Define complete bipartite graph. Prove that Kuratowski's second graph $K_{3,3}$, is nonplanar. **(06 Marks)**

b. Show that in any connected planar graph with 'n' vertices, 'e' edges and 'f' faces, e-n+2=f (Euler's formula). **(07 Marks)**

c. Define chromatic number and chromatic polynomial. Find the chromatic polynomial for the graph given below: **(07 Marks)**

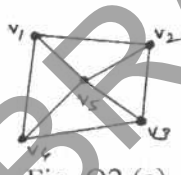

Fig. Q2 (c)

3 a. Define : i) Tree ii) Binary rooted tree, and iii) Prefix code. Give one example for each. **(06 Marks)**

b. Prove that a tree with 'n' vertices has (n-1) edges. **(07 Marks)**

c. Find all the spanning trees of the graph given below: **(07 Marks)**

Fig. Q3 (c)

4 a. Define : i) Matching ii) Complete matching and iii) Edge-connectivity (with example). **(06 Marks)**

b. Find a minimal spanning tree using prims algorithm for the weighted graph given below: **(07 Marks)**

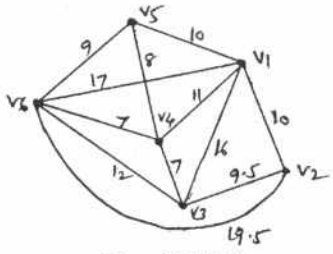

Fig. Q4 (b)

4 c. Find the maximum flow possible between the vertices A and D for the following graph: **(07 Marks)**

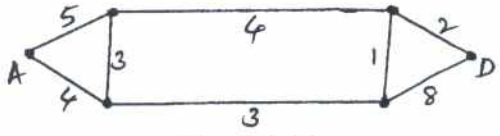

Fig. Q4 (c)

PART – B

5 a. In how many ways can one distribute 10 identical white marbles among six distinct containers? **(06 Marks)**

b. i) How many 9 letter words can be formed using the letters of the word "Difficult"?

ii) A certain question paper contains two parts A and B each having 4 questions. How many different ways a student can answer 5 questions by selecting at least two questions from each part? **(07 Marks)**

c. Let a triangle ABC be equilateral, with AB = 1. Show that if we select 10 points in the interior of this triangle, there must be at least two points, whose distance apart is less than $\frac{1}{3}$. **(07 Marks)**

6 a. In how many ways can the integers 1, 2, 3, ...10 be arranged in a line, so that, no even integer is in its natural place? **(06 Marks)**

b. In how many ways can one arrange the letters in CORRESPONDENTS so that:

i) There are exactly two pairs of consecutive identical letters.

ii) There are at least three pairs of consecutive identical letters. **(07 Marks)**

c. An apple, a banana, a mango and an orange are to be distributed to four boys B_1, B_2, B_3 and B_4. The boys B_1 and B_2 do not wish to have the apple, the boy B_3 does not want the banana or mango and B_4 returns the orange. In how many ways the distribution can be made so that no boy is displeased? **(07 Marks)**

7 a. Let $f(x) = (1 + x + x^2)(1 + x)^n$, where $n \in z^+$. Find the coefficient of the following in the expansion of f(x):

i) x^7 ii) x^8 iii) x^r, $0 \le r \le (n+2)$, $r \in z$. **(06 Marks)**

b. In how many ways can 12 oranges be distributed among three children A, B, C so that A gets at least four, B and C get at least two but C gets no more than five? **(07 Marks)**

c. Find the exponential generating function for the number of ways to arrange 'n' letters, $n \ge 0$, selected from each of the following words:

i) HAWAII ii) MISSISSIPPI iii) ISOMORPHISM **(07 Marks)**

8 a. The number of bacteria in a culture is 1000 (approximately) and this number increases 250% every two hours. Use a recurrence relation to determine the number of bacteria present after one day. **(06 Marks)**

b. Solve the recurrence relation,

$a_n - 6a_{n-1} + 9a_{n-2} = 0$, $n \ge 2$, given $a_0 = 5$, $a_1 = 12$ **(07 Marks)**

c. Find the generating function for the recurrence relation,

$a_{n+2} - 5a_{n+1} + 6a_n = 2$, $n \ge 0$, with $a_0 = 3$, $a_1 = 7$. Hence solve it. **(07 Marks)**

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06CS43

Fourth Semester B.E. Degree Examination, December 2010
Analysis and Design of Algorithms

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is an algorithm? With a neat diagram, explain the algorithm design and analysis process. **(10 Marks)**

b. Define the asymptotic notations for worst case, best case and average case time complexities. Give example. **(10 Marks)**

2 a. With a suitable example, explain the significance of the order of growth in analyzing the algorithm efficiency. **(10 Marks)**

b. Prove that : i) $\frac{1}{2}n(n-1) \in \theta(n^2)$ ii) $n! \in \Omega(2^n)$. **(04 Marks)**

c. Distinguish between the two common ways to represent a graph – given the representation of undirected graph. Explain how the following can be ascertained by the representation
i) The graph is completed ii) The graph has a loop iii) The graph has an isolated vertex
Answer for each of the representation separately. **(06 Marks)**

3 a. What is a "Bruteforce" method? Under what condition does the method become desirable? **(06 Marks)**

b. State the merge sort algorithm and analyze its complexity. **(08 Marks)**

c. Outline an exhaustive search algorithm to solve the traveling salesman problem. **(06 Marks)**

4 a. Briefly explain the strassen's matrix multiplication. How it uses divide and conquer method? Obtain its time complexity. **(06 Marks)**

b. Write an algorithm to topologically sort a diagrph using DFS. Prove the correctness of the algorithm, with examples. **(08 Marks)**

c. With the suitable example, explain the Johnson trotter algorithm, to generate the permutation of given objects. **(06 Marks)**

PART - B

5 a. What is an AVL tree? Explain the four types of rotations used to construct the AVL tree. Insert 1, 25, 28, and 12 in the following tree.

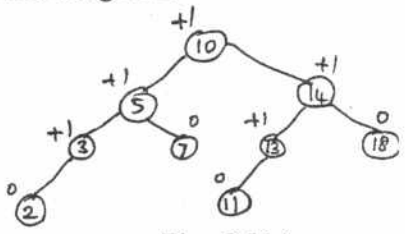

Fig. Q5(a) **(10 Marks)**

b. When does collision occur in hashing? Arrange the following keys in the hash table of size 10, using open hashing technique. A, GOOD, STUDENT, WORKS, HARD. **(04 Marks)**

c. Construct a Huffman code for the following data :

Char	A	B	C	D	E
Probability	0.4	0.1	0.25	0.2	0.15

i) Encode the text A B A C A B A D using generated code
ii) Decode the text whose encoding is 10001011100101. **(06 Marks)**

6 a. With the help of pseudocode, explain Marshall's algorithm to find the transitive closure of a directed graph. Apply it to the graph shown below : **(10 Marks)**

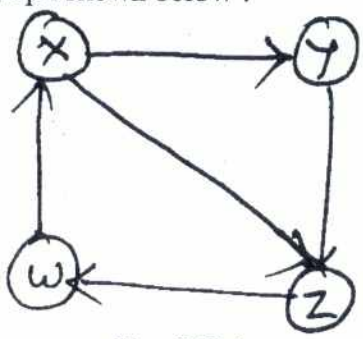

Fig. Q6(a)

b. Find the minimum spanning tree, using Prim's method for the graph shown below:

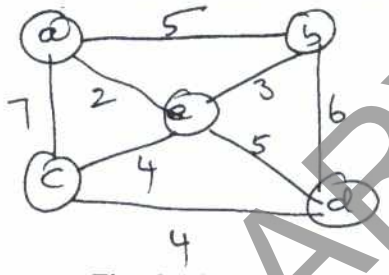

Fig. Q6(b) **(10 Marks)**

7 a. Find the single source shortest paths. Apply the Dijkstra's algorithm to Fig. Q7(a), to get the shortest path form the vertex to all the other vertices.

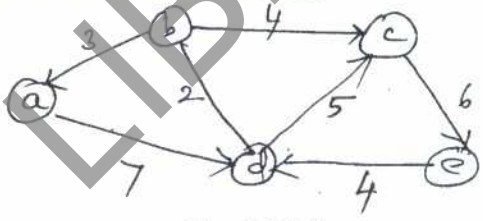

Fig. Q7(a) **(10 Marks)**

b. Write a bottom-up dynamic algorithm for the knapsack problem. Apply it on the following instance of the knapsack problem. **(10 Marks)**

Item	Weight	Value
1	2	3
2	3	4
3	4	5
4	5	6

Table Q7(b)

8 a. Define P, NP and NP complete problem. **(04 Marks)**

b. Explain how the TSP problem can be solved using branch and bound methods. **(06 Marks)**

c. Explain the back – traching algorithm. Apply the same to solve the following instance of the subset sum problem
s = {5, 10, 12, 13, 15, 18} and d = 30. **(10 Marks)**

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06CS44

Fourth Semester B.E. Degree Examination, December 2010
Object Oriented Programming with C++

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. State the important features of object oriented programming. Compare the object oriented system, with procedure oriented system. **(08 Marks)**

b. What is function overloading? Illustrate function overloading through add function which adds two integers, two float numbers. **(06 Marks)**

c. Explain the working of inline functions, with an example. **(06 Marks)**

2 a. What is a friend class? Illustrate friends as bridges. **(10 Marks)**

b. Explain: i) this operator ii) arrow operator. **(05 Marks)**

c. What are nested classes? **(05 Marks)**

3 a. What is a constructor? Explain different types of constructors. **(08 Marks)**

b. Explain new and delete operators used in dynamic memory allocation. **(10 Marks)**

c. What is a destructor? **(02 Marks)**

4 a. What is inheritance? Explain the different types of inheritance possible in C++. **(10 Marks)**

b. Write a C++ program to create a class STUDENT with data members USN, name and age.Using inheritance, create class UGSTUDENT having fields semester, fees and stipend. Enter data for at least 5 students and compute the semesterwise average age for UG students. **(10 Marks)**

PART – B

5 a. What is a virtual function? Explain with a suitable example. **(10 Marks)**

b. Write a short note on I/O stream classes, with hierarchy for C++ stream handling. **(05 Marks)**

c. What is a pure virtual function? Explain with an example. **(05 Marks)**

6 a. Distinguish between text and binary files. **(05 Marks)**

b. How are opening and closing of files handled in C++? **(05 Marks)**

c. Illustrate the overloading of + + and – – operators. **(10 Marks)**

7 a. Write a program to add two complex numbers by overloading the + operator. Display the complex numbers by overloading << operator. **(10 Marks)**

b. Illustrate the overloading of new and delete operators. **(10 Marks)**

8 a. What is exception handling? How are exceptions handled in C++? **(10 Marks)**

b. Write short notes on :
i) RTTI
ii) Templates **(10 Marks)**

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06CS45

Fourth Semester B.E. Degree Examination, December 2010
Microprocessors

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is a microprocessor? With a neat block diagram, giving the importance of instruction queue, explain the architecture of 8086 microprocessor. **(10 Marks)**

b. In brief, explain the different types of microprocessors. **(06 Marks)**

c. Explain the sequence of operations to be performed during the execution of an instruction. **(04 Marks)**

2 a. Explain the significance of special bit indicators available in 8086. **(06 Marks)**

b. If the opcode for MOV is 100010, then find the opcodes for the following instructions:
i) MOV CX, AX ii) MOV AL, [BX]
iii) MOV DS : [BP]12, AH iv) MOV BL, [SI]06H **(08 Marks)**

c. With the flag register format, explain the status flags of 8086. **(06 Marks)**

3 a. Replace the following program segments by their single equivalent instruction: **(06 Marks)**
i) NEGCL
ADD BL, CL
CMC
ii) MOV CL, 02H
DIV CL

b. Write an 8086 program to pack a 2-digit unpacked BCD number, available in memory locations, LOC and LOC + 1. **(06 Marks)**

c. Clearly showing delay calculation details, write an ALP to generate a delay of 50 msec for an 8086 microprocessor, operating at 5 MHz clock frequency. **(08 Marks)**

4 a. Give the comparisons between macros and procedures. **(04 Marks)**

b. With suitable examples, explain the repeat prefixes available in 8086. **(06 Marks)**

c. Write an ALP to find the number of ovels in a given string. **(10 Marks)**

PART – B

5 a. Explain the following :
i) INCLUDE ii) DAS iii) XLAT iv) LDS v) PUBLIC vi) ENDP **(12 Marks)**

b. Write program segments to set and reset TRAP flag. **(08 Marks)**

6 a. With a neat block diagram, explain memory organization of 8086 microprocessor. **(10 Marks)**

b. Clearly indicating demultiplexing details, explain minimum mode configuration of 8086. **(10 Marks)**

7 a. What is an interrupt? Discuss the interrupts classification in 8086. **(07 Marks)**

b. What do you mean by an IVT? Explain IVT in 8086 microprocessor. **(07 Marks)**

c. Explain the microprocessor's response for an INTR interrupt. **(06 Marks)**

8 a. With a neat block diagram, explain the functioning of 8255 PPI. **(10 Marks)**

b. Write the control word format and 8255 initialization to set PC_5 and reset PC_3 bits of port C. **(05 Marks)**

c. With a neat diagram showing details of signal directions, explain the input data transfer. **(05 Marks)**

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06CS46

Fourth Semester B.E. Degree Examination, December 2010
Computer Organization

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is a stored program concept? Explain the functional units of a stored program digital computer, along with a block diagram. **(10 Marks)**

b. Define the following terms:
i) Processor clock ii) RISC iii) SPEC rating
iv) Basic performance equation v) the stack frame **(10 Marks)**

2 a. Represent the decimal values 5, -2 and -10 in the following binary formats:
i) Sing and magnitude ii) 1's complement iii) 2's complement. **(06 Marks)**

b. Registers R_1 and R_2 of a computer, contain the decimal values 1200 and 4600. What is EA of the memory operand in each of the following instructions?
i) Load $20(R_1)$, R_5
ii) MOVE #3000, R_5
iii) Store R_5 , $30(R_1 , R_2)$
iv) Add $-(R_2)$, R_5
v) Subtract $(R_1)+$, R_5 **(05 Marks)**

c. Consider the following possibilities for saving the return address of a subroutine:
i) In a processor register
ii) In a memory location
iii) On a stack
Which of these possibilities support the subroutine nesting and which support subroutine recursion? **(09 Marks)**

3 a. What is an interrupt? Explain polling and vectored interrupts with their advantages and disadvantages. **(08 Marks)**

b. What is DMA? What are its advantages? With the supporting diagram, explain different registers in a DMA interface. **(06 Marks)**

c. What is bus arbitration? Explain the centralized arbitration, with a neat diagram. **(06 Marks)**

4 a. What is a synchronous bus? Explain the timing of an input transfer on a synchronous bus with a timing diagram. **(06 Marks)**

b. Define:
i) Cycle stealing
ii) burst mode
iii) Full handshake
iv) Plug-and-play **(08 Marks)**

c. What are the interface circuits? Explain a general 8-bit parallel interface, with a neat diagram. **(06 Marks)**

PART – B

5 a. Explain the synchronous DRAM, with a neat diagram. **(10 Marks)**

b. What is a cache? Explain any two cache mapping functions. **(10 Marks)**

6 a. What are the replacement algorithms? Briefly explain the LRU replacement algorithm. **(08 Marks)**

b. What is a virtual memory? With a neat block diagram, explain the virtual memory address translation. **(08 Marks)**

c. Briefly explain the controller's major functions on the disk drive side. **(04 Marks)**

7 a. With a neat diagram, explain the floating point addition/subtraction unit. **(10 Marks)**

b. With a neat block diagram, explain the 4-bit carry-lookahead adder. **(10 Marks)**

8 a. Explain the 3-bus organization of the data path with a neat diagram and write the control sequence for the instruction ADD R4, R5, R6 for the 3-bus organization. **(10 Marks)**

b. With a neat block diagram, explain the hardwired control unit. **(10 Marks)**

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MATDIP401

Fourth Semester B.E. Degree Examination, December 2010

Advanced Mathematics - II

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Find the ratio in which the line joining (2, 4, 16) and (3, 5, −4) is divided by the plane $2x-3y+z+6=0$. **(06 Marks)**

b. Find the angle between the lines whose direction cosines are given by $3l+3+5n=0$ and $6mn-2ln+5lm=0$. **(07 Marks)**

c. Derive the equation of the plane in the form $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$. **(07 Marks)**

2 a. Find the reflection of the point (1, 3, 4) in the plane $2x-y+z+3=0$. **(07 Marks)**

b. Find the equation of the line through (1, 2, -1) and perpendicular to each of the lines $\frac{x}{1}=\frac{y}{0}=\frac{z}{-1}$ and $\frac{x}{3}=\frac{y}{4}=\frac{z}{5}$. **(06 Marks)**

c. Prove that the lines $\frac{x-4}{1}=\frac{y+3}{-4}=\frac{1+z}{7}$ and $\frac{x-1}{2}=\frac{y+1}{-3}=\frac{z+10}{8}$ intersect and find the coordinates of their point of intersection. **(07 Marks)**

3 a. If $\vec{A}=\hat{i}+2\hat{j}-3\hat{k}$ and $\vec{B}=3\hat{i}-\hat{j}+2\hat{k}$ then :

i) Show that $\vec{A}+\vec{B}$ and $\vec{A}-\vec{B}$ are orthogonal and

ii) Find the angle between $2\vec{A}+\vec{B}$ and $\vec{A}+2\vec{B}$. **(07 Marks)**

b. Prove that $[\vec{A}+\vec{B},\vec{B}+\vec{C},\vec{C}+\vec{A}]=2[\vec{A}\,\vec{B}\,\vec{C}]$. **(06 Marks)**

c. If $\vec{A}=2\hat{i}-\hat{j}+3\hat{k}$, $\vec{B}=-\hat{i}+3\hat{j}+3\hat{k}$ and $\vec{C}=\hat{i}+\hat{j}-2\hat{k}$, find the reciprocal triad $(\vec{A}'\vec{B}'\vec{C}')$. **(07 Marks)**

4 a. For the curve $\vec{R}=a(\cos t\,\hat{i}+\sin t\,\hat{j}+t\tan\alpha\,\hat{k})$ where a and α are constants, evaluate $\left|\frac{d\vec{R}}{dt}\times\frac{d^2\vec{R}}{dt^2}\right|$. **(06 Marks)**

b. The position vector of a moving particle at time t is $\vec{R}=t^2\hat{i}-t^3\hat{j}+t^4\hat{k})$. Find the tangential and normal components of its acceleration at t = 1. **(07 Marks)**

c. Find the directional derivative ϕ = xyz along the direction of the normal to the surface $x^2z+y^2x+z^2y=3$ at the point (1, 1, 1). **(07 Marks)**

5 a. Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$ where $r^2 = x^2 + y^2 + z^2$. **(07 Marks)**

b. If $\vec{F} = e^{xyz}(\hat{i}+\hat{j}+\hat{k})$ find div $\vec{F}$ and curl $\vec{F}$. **(06 Marks)**

c. Prove that $\nabla \times \nabla \times \vec{F} = \nabla(\nabla.\vec{F}) - \nabla^2 \vec{F}$. **(07 Marks)**

6 a. Prove that $L\{\cos at\} = \frac{s}{s^2 + a^2}$ $s > 0$ **(05 Marks)**

b. Find : i) $L\{e^{-t}\sin^2 t\}$ ii) $L\{te^{-t}\sin 3t\}$ iii) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ **(15 Marks)**

7 a. IF $f(t) = \begin{cases} t^2, & 0 < t < 2 \\ t-1, & 2 < t < 3 \\ 7, & t > 3 \end{cases}$, find $L\{f(t)\}$. **(07 Marks)**

b. Find $L^{-1}\left\{\frac{4s+5}{(s-1)^2(s+2)}\right\}$. **(06 Marks)**

c. Apply convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$. **(07 Marks)**

8 a. If $f'(t)$ is a continuous function and $L\{f(t)\} = F(s)$ then prove that $L\{f'(t)\} = sF(s) - f(0)$. **(04 Marks)**

b. Solve the following using Laplace transform :
$y'' + 2y' - 3y = \sin t$, when $y(0) = 0 = y'(0)$. **(06 Marks)**

c. Using Laplace transform method, solve the simultaneous equations:
$\frac{dx}{dt} + 5x - 2y = t$; $\frac{dy}{dt} + 2x + y = 0$, given $x = y = 0$, when $t = 0$. **(10 Marks)**

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