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06MAT31

Third Semester B.E. Degree Examination, Dec.09/Jan.10

Engineering Mathematics - III

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Obtain Fourier series for the function f(x) given by

$$f(x)=\begin{cases}1+\dfrac{2x}{\pi}, & -\pi\le x\le 0\\ 1-\dfrac{2x}{\pi}, & 0\le x\le \pi\end{cases}$$

and hence deduce that $\dfrac{\pi^2}{8}=\dfrac{1}{1^2}+\dfrac{1}{3^2}+\dfrac{1}{5^2}+$............. **(07 Marks)**

b. Find the half-range cosine series for the function $f(x)=(x-1)^2$ in the interval $0<x<1$. **(07 Marks)**

c. Obtain the constant term and the coefficients of the first sine and cosine terms in the Fourier expansion of y as given in the following table. **(06 Marks)**

x	0	1	2	3	4	5	6
y	9	18	24	28	26	20	9

2 a. Find the Fourier transform of $f(x)=\begin{cases}1-x^2, & |x|\le 0\\ 0, & |x|>\pi\end{cases}$.

Hence evaluate $\displaystyle\int_0^\infty \frac{x\cos x-\sin x}{x^3}.\cos\left(\frac{x}{2}\right)dx$ **(07 Marks)**

b. Find the Fourier cosine transform of e^{-x^2} **(07 Marks)**

c. Find the Fourier sine transform of $e^{-|x|}$. Hence show that $\displaystyle\int_0^\infty \frac{x\sin mx}{1+x^2}dx=\frac{\pi}{2}.e^{-m}$, $m>0$. **(06 Marks)**

3 a. Form the partial differential equation by eliminating the arbitrary functions f and g from the relation $z=y^2+2f\left(\dfrac{1}{x}+\log y\right)$ **(07 Marks)**

b. Solve $\dfrac{\partial^3 t}{\partial x^2\partial y}+18xy^2+\sin(2x-y)=0$ **(07 Marks)**

c. Solve $(mz-ny)\dfrac{\partial z}{\partial x}+(nx-lz)\dfrac{\partial z}{\partial y}=(ly-mx)$ **(06 Marks)**

4 a. Derive one dimensional heat equation by taking u(x, t) as the temperature, x is the distance and t is the time. (Write the figure also.) **(07 Marks)**

b. Obtain the D'Almbert's solution of the wave equation $u_{tt}=C^2u_{xx}$, subject to the condition $u(x,o)=f(x)$ and $\dfrac{\partial u}{\partial t}(x,o)=o$. **(07 Marks)**

c. Obtain the various solutions of the Laplace's equation $u_{xx}+u_{yy}=0$, by the method of separation of variables. **(06 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

5 a. Complete the real root of the equation $x\log_{10}x - 1.2 = 0$ by Regula-Falsi method, correct to four decimal places. **(07 Marks)**

b. Solve the system of equations using Gauss-Jordan method:

$$2x + 5y + 7z = 52$$
$$2x + y - z = 0$$
$$x + y + z = 9$$
(07 Marks)

c. Using the power method, find the largest Eigen value and the corresponding Eigen vector of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ **(06 Marks)**

6 a. The area of a circle (A) corresponding to diameter (D) is given below: **(07 Marks)**

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

Find the area corresponding to diameter 105 using an appropriate interpolation formula.

b. Use Newton's divided difference formula to find f(9), given the data, **(07 Marks)**

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

c. Evaluate $\int_4^{5.2} \log_e x \, dx$ using Weddle's rule, taking 7 ordinates. **(06 Marks)**

7 a. Derive Euler's equation in the form

$$\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$$
(07 Marks)

b. Find the curves on which the functional $\int_0^1 \left[(y')^2 + 12xy\right]dx$, with $y(0) = 0$ and $y(1) = 1$ can be extremised. **(07 Marks)**

c. Find the geodesics on a surface given that the arc length on the surface is $S = \int_{x_1}^{x_2} \sqrt{x[1+(y')^2]}\, dx$ **(06 Marks)**

8 a. Find the Z-transforms of the following :
i) $\cosh n\theta$ ii) $(n+1)^2$ **(07 Marks)**

b. Find the inverse z-transform of $\dfrac{z}{(z-1)(z-2)}$. **(07 Marks)**

c. Find the response of the system $y_{n+2} - 5y_{n+1} + 6y_n = u_n$ with $y_0 = 0$, $y_1 = 1$ and $u_n = 1$ for n = 0, 1, 2, 3, ... by z-transform method. **(06 Marks)**

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06CS32

Third Semester B.E. Degree Examination, Dec.09/Jan.10

Electronic Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With a neat diagram and waveforms, explain the working of a positive camper with respect to the stiff clamper condition. **(08 Marks)**

b. An LED is used in the indicator circuit for the a.c. power line of 230V AC with 50Hz frequency. The circuit consists of a capacitor of 0.68μf. Calculate the capacitive reactance and average LED current. **(04 Marks)**

c. Explain with relevant diagrams, the principle of operation of a varactor diode. **(08 Marks)**

2 a. Explain with a neat circuit diagram and a.c. equivalent circuit, the working of base biased amplifier. **(08 Marks)**

b. Sketch the output waveform for the clipper circuit of FigQ2(b) shown below. Assume silicon diode and obtain the peak magnitude of the output waveform.

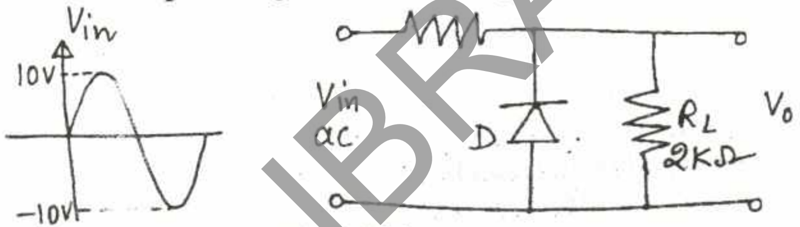

Fig.Q2(b) **(06 Marks)**

c. Find the voltage gain and output voltage across the load resistor for the given circuit of FigQ2(c).

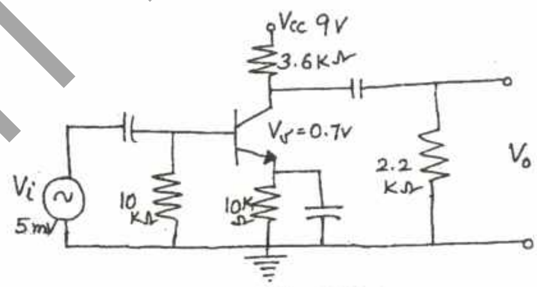

Fig.Q2(c) **(06 Marks)**

3 a. Explain the working of a swamped amplifier with a neat circuit diagram. Derive the expression for voltage gain. **(08 Marks)**

b. Draw the cascaded CE and CC stages of amplifier. Explain. **(06 Marks)**

c. Derive an expression for an output voltage for a series feedback type regulator. **(06 Marks)**

4 a. Explain the principal of operation of class B push-pull amplifier with a neat circuit diagram and relevant waveforms. **(08 Marks)**

b. In a class B amplifier, $V_{CE(min)}$ = 1 volt, supply voltage V_{CC} = 18 volts. Calculate the collector circuit efficiency. **(04 Marks)**

c. What is digital switching? Explain in detail passive load switching and active load switching. **(08 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.

PART –B

5 a. What is impedance matching? Explain. **(04 Marks)**
b. Explain briefly decibel power gain and decibel voltage gain. **(06 Marks)**
c. Explain ideal closed loop voltage gain, gain stability, closed loop input impedance, closed loop output impedence and non linear distortion, with respect to VCVS amplifier. **(10 Marks)**

6 a. With relevant details, explain VCIS amplifier. **(06 Marks)**
b. Write a note on comparators with nonzero references. **(06 Marks)**
c. With a neat circuit diagram and waveforms, explain the sine wave to rectangular converter, using OP-AMP. **(08 Marks)**

7 a. Explain the principle of relaxation oscillator to generate rectangular output. Draw a neat circuit diagram and waveform. **(08 Marks)**
b. Explain with a neat connection diagram and waveforms, how IC555 timer is used as a stable multivibrator. **(08 Marks)**
c. What do you know about phase locked loops? Explain. **(04 Marks)**

8 Write an explanatory note on :
a. Opto electronic devices
b. Load lines in power amplifiers
c. Voltage controlled oscillator
d. Switching regulators. **(20 Marks)**

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Third Semester B.E. Degree Examination, Dec.09/Jan.10
Logic Design

Time: 3 hrs. Max. Marks:100

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

PART-A

1 a. Implement $AB+\overline{C}\,\overline{D}$ with only three NAND gates. Draw logic diagram also. Assume inverted input is available. **(06 Marks)**

b. Reduce the following functions using K-map techniques.
i) $f(P,Q,R,S) = \Sigma m\ (0, 1, 4, 8, 9, 10) + d(2, 11)$
ii) $f(A,B,C,D) = \Pi m\ (0, 2, 4, 10, 11, 14, 15)$. **(06 Marks)**

c. Reduce the following function by using quine McClusky method
$f(A, B, C, D) = \Sigma m\ (0, 1, 2, 3, 10, 11, 12, 13, 14, 15)$. **(08 Marks)**

2 a. Define an encoder. Design a priority encoder the truth table of which is shown in table Q2(a). The order of priority of inputs is $X_1 > X_2 > X_3$

Inputs				Outputs	
S	X_1	X_2	X_3	A	B
0	x	x	x	0	0
1	1	x	x	0	1
1	0	1	x	1	0
1	0	0	1	1	1
1	0	0	0	0	0

Table Q2(a) **(06 Marks)**

b. What is magnitude comparator? Write the truth table and circuit diagram of a 1 bit comparator. **(06 Marks)**

c. Mention different types of ROMS and explain each of them. **(08 Marks)**

3 a. Show the 8-bit addition of following decimal numbers into 2's compliment representation
i) +125 and – 68 ii) + 37 and – 115 iii) – 43 and – 78. **(06 Marks)**

b. What is a full adder? Give the truth table of full adder. From this truth table design a full adder circuit. **(08 Marks)**

c. Explain the working of a parallel adder. What are its advantages and disadvantages over a serial adder? **(06 Marks)**

4 a. What is a system clock? What are the characteristics of an ideal clock? **(06 Marks)**

b. Show how a D flip-flop can be converted to SR flip-flop. **(06 Marks)**

c. Explain the working of a JK flip-flop. Write its truth table, state diagram and excitation table. **(08 Marks)**

PART-B

5 a. Name and explain in short the four basic types of shift registers and draw a block diagram for each. **(06 Marks)**

b. Mention the differences between ripple and synchronous counters. **(06 Marks)**

c. Design a synchronous mod-3 counter with the following binary sequence using clocked JK flip-flops.
Counter sequence 0, 1, 2, 0, 1, 2. **(08 Marks)**

6 a. Write a note on Moore and Mealy models with respect to design of sequential circuits. Compare the two models. **(06 Marks)**

b. Draw an ASM chart for a 2-bit counter having one enable line E such that E = 1 (counting enabled) E = 0 (counting disabled). **(06 Marks)**

c. Reduce state transition diagram (Moor model) of Fig. Q6(c) by
i) Row elimination method
ii) Implication table method. **(08 Marks)**

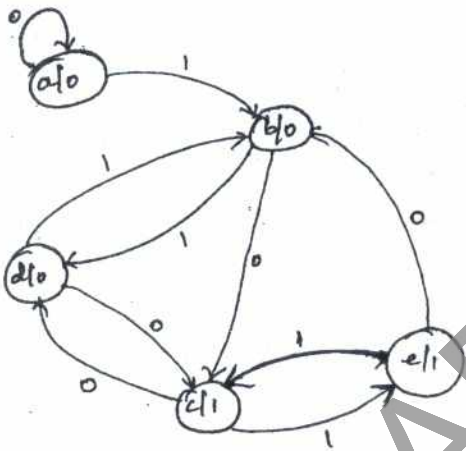

Fig. Q 6(c)

7 a. What is the binary ladder? Explain the binary ladder with a digital input of 1000. **(06 Marks)**

b. What is accuracy and resolution of the D/A converter? What is the resolution of a 9-bit D/A converter which uses a ladder network? If the full scale output voltage of this converter is + 5V, what is the resolution in volts? **(06 Marks)**

c. Explain continuous A/D conversion with an example. **(08 Marks)**

8 a. What is a MOSFET? Explain its working. **(06 Marks)**

b. Discuss the features of high speed TTL, low power TTL, Schottky TTL families. **(06 Marks)**

c. Explain method for interfacing CMOS devices to TTL devises. **(08 Marks)**

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Third Semester B.E. Degree Examination, Dec.09/Jan.10

Discrete Mathematical Structures

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Let x be the set of all three digit integers that is x = { x is an integer / $100 \le x \le 999$}. If A_i is the set of numbers in x whose i^{th} digit is *i*, compute the cardinality of the set $A_1 \cup A_2 \cup A_3$. **(05 Marks)**

b. Using the laws of set theory, simplify each of the following :

i) $A \cap (B - A)$ ii) $\overline{\overline{(A \cup B) \cap C} \cup \overline{B}}$ **(05 Marks)**

c. State and prove Demorgan's laws set theory. **(05 Marks)**

d. Among the integers 1 – 200 find the numbers of integer's that are :

i) Divisible by 2 or 5 or 9 ii) Not divisible by 5

iii) Not divisible by 2 or 5 or 9 iv) Divisible by 5 or not by 2 or 9 **(05 Marks)**

2 a. Define tautology S.T

$[(pvq) \cap (p \to r) \wedge (q \to r)] \to r$ is a tautology by constructing truth table. **(05 Marks)**

b. Prove the following by using laws of logic :

i) $p \to (q \to r) \Leftrightarrow (p \wedge q) \to r$ ii) $[\sim p \wedge (\sim q \wedge r)] \vee [(q \wedge r) \vee (p \wedge r)] \Leftrightarrow r$ **(05 Marks)**

c. Verify the principles of duality for the logical equivalence :

i) $\sim (p \wedge q) \to \sim pv(\sim p \vee q) \Leftrightarrow \sim p \vee q$ ii) P.T.$[p \wedge (p \to q) \wedge r] \Rightarrow (p \vee q) \to r$ **(05 Marks)**

d. Check whether the following is a valid argument:

If I study, then I will not fail in the examination. If I do not watch T.V. in the evening I will study.

I failed in the examination

$\therefore$ I must have watch T.V. in the evening. **(05 Marks)**

3 a. Define an open statement. Write down the negation of following statements:

i) For all integer 'n' if n is not divisible by 2 then n is odd.

ii) If k, m, n are any integers when (k – m) and (m – n) are odd then (k – n) is even. **(05 Marks)**

b. For the universe of all integers, define the following open statements:

Let p(x) : x > 0, s(x) : x is divisible by 3, q(x) : x is even, r(x) : x is a perfect square, t(x) : x is divisible by 7. Write down the following quantified statements in symbolise form :

i) At least one integer is even ii) Some even integers are divisible by 3

iii) For every integer is either even or odd

iv) If x is even and a perfect square then x is not divisible by 3

v) If x is odd or is not divisible by 7 then x is divisible by 3. **(05 Marks)**

c. i) PT $\exists x q(x)$ follows logically from the premises $\forall x p(x) \to q(x)$ and $\exists x p(x)$

ii) PT the following argument is valid where 'C' is the specification element of universe

$\forall x[p(x) \to q(x)]$

$\forall x[q(x) \to r(x)]$ **(05 Marks)**

$\sim r(c) / \therefore \sim p(c)$

d. Give direct proof of the statement if n is odd integer and n^2 is an odd integer. **(05 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.

4 a. Prove by mathematical induction that for all (+)ve integer $n \geq 1$, $1+2+3+\ldots\ldots+n = \frac{n(n+1)}{2}$ **(05 Marks)**

b. A sequence $\{a_n\}$ is defined successively by $a_1 = 4$, $a_n = a_{n-1}+n$, for $n \geq 2$ find an explicit form. **(05 Marks)**

c. The fibonacci numbers are defined recursively by $F_0 = 0$, $F_1 = 1$ and $F_n = F_{n-1}+F_{n-2}$ for $n \geq 2$. Evaluate F_2 to F_{10}. **(05 Marks)**

d. The Ackermann's number. $A_{m,n}$ are defined recursively for $m, n \in N$ as follows:

$A_{o,n} = n + 1$, for $n \geq 0$

$A_{m,o} = A_{m-1,1}$ for $m \geq 0$

$A_{m,n} = A_{m-1,p}$ where $p = A_{m,n-1}$ form $m, n \geq 0$

P.T. $A_{1,n} = n + 2$ for all $n \in N$ **(05 Marks)**

PART – B

5 a. Let A = {1 2 3 4}. Let 'R' be a relation on A defined by xRy iff x/y and y = 2x write down:

i) 'R' is a relation of set of ordered pairs

ii) Draw di-graph of R

iii) Determine in degrees and out-degrees of a diagraph **(05 Marks)**

b. Define the following terms and give an example for each:

i) Reflexive ii) Irreflexive iii) Anti symmetric

iv) Transitive v) Symmetry **(05 Marks)**

c. Let R be an equivalence relation on A and (ab)∈A then ST the following statement are:

i) $a \in [a]$ or $a \in R(a)$ ii) aRb iff, $[a] = [b]$ or $R(a) = R(b)$

iii) $[a] \cap [b] \neq \phi$ then $[a] = [b]$ **(05 Marks)**

d. Draw the hasse diagram respresented by the positive divisor of 36. **(05 Marks)**

6 a. Let A = B = {1 2 3 4}

i) f = (1 1) (2 3) (3 4) (4 2) ii) let A = {a b c}, B = {1 2 3 4} f = {(a 1) (b 1) (c 4)}

iii) A = {1 2 3 4}, b ={a b c d}, f = {(1 a) (2 a) (3 d) (4 c)}.

Determine 'f' is one-one or on to. **(05 Marks)**

b. If m and n are positive integers with $1 \leq n \leq m$, P.T. $s(m + 1, n) = s(m, n - 1) + n\, s(m, n)$ **(05 Marks)**

c. If $f: A \rightarrow B$ is invertible then it has unique inverse. **(05 Marks)**

d. State Pigeon-hole principle. If (n + 1) number are chosen from 1 to 2n at least one pair add to (2n + 1). **(05 Marks)**

7 a. Define Abelian group. Prove that a group G is abelian if and only if for all a, b ∈ G, $(a, b)^{-1} = a^{-1}b^{-1}$ **(05 Marks)**

b. Define a cyclic group, show that every cyclic group is abelian but the converse is not true. **(05 Marks)**

c. State and prove Lagrange's theorem. **(05 Marks)**

d. Let $f: G \rightarrow H$ be a homomorphism from G into H. If G is abelian, prove that H is also abelian. **(05 Marks)**

8 a. Prove that every field is an integral domain. **(05 Marks)**

b. S is a subring of R if and only if :

i) For all a, b∈S, we have a + b ∈S and ab∈S ii) For all a∈S, we have -a∈S **(05 Marks)**

c. Show that Z_5 is an integral domain. **(05 Marks)**

d. Prove that Zn is a field if and only if n is a prime. **(05 Marks)**

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06CS35

Third Semester B.E. Degree Examination, Dec.09/Jan.10
Data Structures with 'C'

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Given the following declarations:

```
int a = 5 ;
int b = 7 ;
int *p = & a ;
int *q = & b ;
```

What is the value of each of the following expressions?

i) ++a
ii) ++(*p)
iii) --(*q)
iv) --b **(04 Marks)**

b. Explain the following with an example:

i) Pointer to pointer
ii) L value and R value
iii) Calloc function. **(09 Marks)**

c. Write a 'C' program to find the smallest element in an array (using pointer and function). **(07 Marks)**

2 a. Explain with syntax strncpy and strcat string handling functions. **(06 Marks)**

b. Write short notes on:

i) Nested structures
ii) Union. **(08 Marks)**

c. Explain the three file status functions available in 'C' language. **(06 Marks)**

3 a. What is a stack? Indicate how stack is represented in 'C'. **(05 Marks)**

b. Write an algorithm to evaluate postfix expression. **(06 Marks)**

c. Convert each of the following infix expressions into its postfix and prefix form

i) $(A + B) * C - D \$ E * F$
ii) $A - B / C * D \$ E$
iii) $(A + B) * (C + D - E) * F$. **(09 Marks)**

4 a. Write a recursive program to find the greatest common divisor (GCD) of two integers. **(06 Marks)**

b. Explain :

i) Efficiency of recursion
ii) Priority queue. **(06 Marks)**

c. Write a C program to simulate the working of linear queue. Provide the following operations: i) insert ; ii) delete ; iii) display. **(08 Marks)**

PART – B

5 a. What are the advantages and disadvantages of representing a stack or queue by a linked list? **(04 Marks)**

b. Write a C program to implement stack operations using singly linked list. **(10 Marks)**

c. Write a note on noninteger and nonhomogeneous list. **(06 Marks)**

6 a. Explain with figure circular list with a header node. **(05 Marks)**

b. Write a C routine concat (& list 1, & list 2) that concatenates two circular singly linked lists. **(05 Marks)**

c. Assume that first and last are external pointers to the first and last nodes of a doubly linked list. Write an algorithm to implement the following:

i) Insert a node to the list at the front end.

ii) Delete a node from the front end. **(10 Marks)**

7 a. Define the following (write appropriate figures)

i) Strictly binary tree

ii) Complete binary tree

iii) Almost complete binary tree. **(09 Marks)**

b. What is a binary search tree? Construct a binary search tree for the following list of integers. 8, 13, 10, 12, 6, 5, 12. **(06 Marks)**

c. Write a C routine setleft (NODEPTR P, int x) which creates a node with information x, as left son of a node pointed by P, in a right – in – threaded binary tree. **(05 Marks)**

8 a. Write an algorithm to find the Kth element of a list represented by binary tree. Explain the algorithm also. **(05 Marks)**

b. Construct a binary tree for the following expressions:

i) $A + (B - C) * (E + F) / G$

ii) $(5 + 6 * 7) \$ ((5 + 6) * 7)$. **(10 Marks)**

c. Convert the following general tree shown in Fig. 8 c(i) and 8 c(ii) to a binary tree **(05 Marks)**

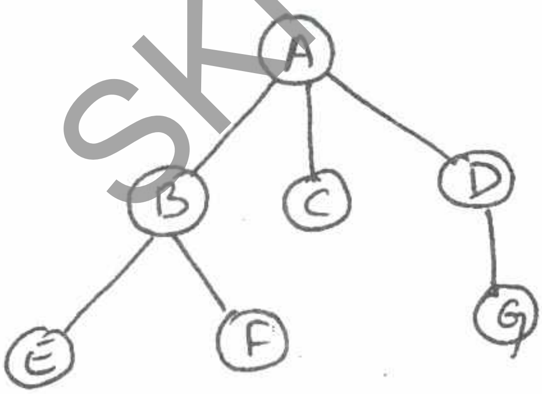

Fig.8 c(i).

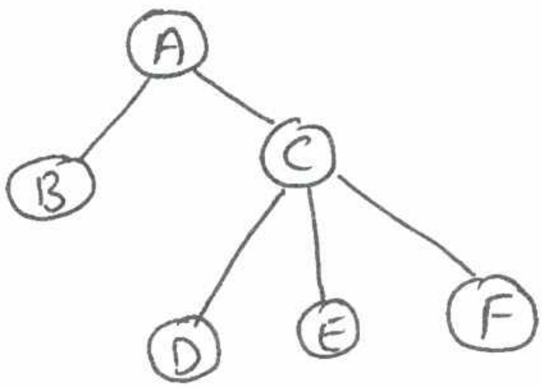

Fig.8 c(ii).

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06CS36

Third Semester B.E. Degree Examination, Dec.09/Jan.10
Unix and Shell Programming

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Define an operating system. Discuss the salient features of UNIX operating system. **(06 Marks)**

b. Explain the architecture of the UNIX operating system. **(08 Marks)**

c. Explain the following commands with examples : i) cat ; ii) rmdir ; iii) pwd. **(06 Marks)**

2 a. A file's current permission are rw_r_xr_ _. Specify the chmod expression required to change them for the following:
i) rw x rw x rw x ; ii) r_ _r_ _ _ _ _ ; iii) _ _ _ _ _ _ _ _ _ ; iv) _ _ _r_ _r_ _. **(08 Marks)**
Using both the relative and absolute methods of assigning permissions.

b. Explain briefly the file attributes listed using ls – l command. **(06 Marks)**

c. What are the different modes of Vi editor? Explain with a diagram. **(06 Marks)**

3 a. Explain what wild – card patterns match:
i) [A – Z] ????* ii) * [0 – 9] *
iii) * [!0 – 9] and iv) * · [!s] [!h]. **(08 Marks)**

b. What are standard input, standard output and standard error? Explain with respect to UNIX. **(06 Marks)**

c. What is process status? Explain PS command with options. **(06 Marks)**

4 a. Explain the following environment variables with examples:
i) SHELL ; ii) LOGNAME ; iii) PATH. **(06 Marks)**

b. Differentiate between hard link and soft link in UNIX with examples. **(06 Marks)**

c. Explain the following commands with examples: i) tail ; ii) paste ; iii) tr ; iv) pr. **(08 Marks)**

PART – B

5 a. What is the difference between a wildcard and a regular expression? Explain the "grep" command using n, *l* and f options with examples. **(08 Marks)**

b. What do these regular expressions match? i) a · * b ; ii) ^ { $. **(04 Marks)**

c. What is sed? With examples explain the difference between line addressing and context addressing in sed? **(08 Marks)**

6 a. What is shell programming? Write a shell program that will do the following tasks, in order:
Clear the screen
Print the current directory
Display current login users. **(08 Marks)**

b. Explain the shell features of "while" and "for" with syntax. **(08 Marks)**

c. What is the "exit" status of a command and where is it stored? **(04 Marks)**

7 a. Write an awk program to find square of all the numbers from 1 to 10. **(08 Marks)**

b. With example, explain the following built-in variables of awk:
i) FS ; ii) NF ; iii) FILENAME. **(06 Marks)**

c. Explain the following built-in functions of awk with examples:
i) substr ; ii) index ; iii) length. **(06 Marks)**

8 a. Explain the following string handling functions of PERL with examples:
i) length ; ii) index ; iii) substr ; iv) reverse. **(08 Marks)**

b. Write a PERL program to print numbers that are accepted from the keyboard using while and an array construct. **(06 Marks)**

c. Explain the following in PERL with examples:
i) Foreach looping construct ; ii) Join. **(06 Marks)**

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MATDIP301

Third Semester BE Degree Examination, Dec.09-Jan.10

Advanced Mathematics – I

Time: 3 hrs. Max. Marks:100

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

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.

1 a. Find the modulus and amplitude of $\frac{4+2i}{2-3i}$. **(06 Marks)**

b. Express the complex number $2+3i+\frac{1}{1-i}$ in the form of a + ib. **(07 Marks)**

c. Express the complex number $\sqrt{3}+i$ in the polar form. **(07 Marks)**

2 a. Find the n^{th} derivative of $e^{-x}\sin^2 x$. **(06 Marks)**

b. Find the n^{th} derivative of $\frac{x}{(x-1)(2x+3)}+e^{2x}$. **(07 Marks)**

c. If $y=\sin^{-1}x$ then prove that $(1+x^2)y_{n+2}-(2n+1)xy_{n+1}-n^2y_n=0$. **(07 Marks)**

3 a. Using Maclaurin's series expand tanx upto the term containing x^3. **(06 Marks)**

b. Find the angle between the radius vector and tangent to the curve $r=\sin\theta+\cos\theta$. **(07 Marks)**

c. With usual notations prove that

i) $P=r\sin\phi$

ii) $\frac{1}{p^2}=\frac{1}{p^2}+\frac{1}{p^4}\left(\frac{dr}{d\theta}\right)^2$. **(07 Marks)**

4 a. If $u=f(r,s,t)$ where $r=\frac{x}{y}$, $s=\frac{y}{z}$, $t=\frac{z}{x}$ then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$. **(06 Marks)**

b. If $u=f(x+ay)+g(x-ay)$ then show that $\frac{\partial^2 u}{\partial y^2}=a^2\frac{\partial^2 u}{\partial x^2}$. **(07 Marks)**

c. If $u=x^2-2y$, $v=x+y+z$, $w=x-2y+3z$ then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$. **(07 Marks)**

5 a. Obtain the reduction formula for $\int\cos^n x\,dx$ where n is a positive integer. **(06 Marks)**

b. Evaluate $\int_0^1 x^6\sqrt{1-x^2}\,dx$. **(07 Marks)**

c. Evaluate $\int_0^1\int_x^{\sqrt{x}}(x^2+y^2)\,dydx$.. **(07 Marks)**

6 a. Evaluate $\int_0^1\int_0^2\int_1^2 x^2yz \; dzdydx$. **(06 Marks)**

b. Prove that $\sqrt{\frac{1}{2}} = \sqrt{\pi}$. **(07 Marks)**

c. Show that $\int_0^{\pi/2}\sqrt{\text{Sin}\theta}\; d\theta \times \int_0^{\pi/2}\frac{d\theta}{\sqrt{\text{Sin}\theta}} = \pi$. **(07 Marks)**

7 a. Solve $(e^y + 1)\,\text{Cos}x\,dx + e^y\,\text{Sin}x\,dy = 0$. **(06 Marks)**

b. Solve $ydx - xdy = \sqrt{x^2 + y^2}\; dx$. **(07 Marks)**

c. Solve $x\frac{dy}{dx} + y = x^3y^6$. **(07 Marks)**

8 a. Solve $4\frac{d^3y}{dx^3} + 4\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$. **(06 Marks)**

b. Solve $\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + 3x = \text{Sin}t + e^{-t}$. **(07 Marks)**

c. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$. **(07 Marks)**

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