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06MAT31

Third Semester B.E. Degree Examination, June-July 2009
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

$$f(x)=\begin{cases}\pi x & \text{for } 0\le x\le 1\\ \pi(2-x) & \text{for } 1\le x\le 2\end{cases}$$ and hence deduce that $\frac{\pi^2}{8}=\sum_{n=1}^{\infty}\frac{1}{(2n-1)^2}$ **(07 Marks)**

b. Obtain the half range cosine series for the function $f(x) = \sin x$ in $0 \le x \le \pi$. **(07 Marks)**

c. Express y as a Fourier series up to first harmonics given

x :	0	60°	120°	180°	240°	300°	360°
y :	7.9	7.2	3.6	0.5	0.9	6.8	7.9

(06 Marks)

2 a. Find the Fourier transform of

$$f(x)=\begin{cases}1 & \text{for } |x|<1\\ 0 & \text{for } |x|>1\end{cases}$$ Hence evaluate $\int_0^{\infty}\frac{\sin x}{x}dx$ **(07 Marks)**

b. Find the Fourier cosine transform of $f(x)=\frac{1}{1+x^2}$ **(07 Marks)**

c. Solve the integral equation $\int_0^{\infty} f(\theta)\cos\alpha\theta\, d\theta=\begin{cases}1-\alpha, & 0\le\alpha\le 1\\ 0, & \alpha>1\end{cases}$ Hence evaluate $\int_0^{\infty}\frac{\sin^2 t}{t^2}dt$ **(06 Marks)**

3 a. Find the partial differential of all planes which are at constant distance from the origin. **(07 Marks)**

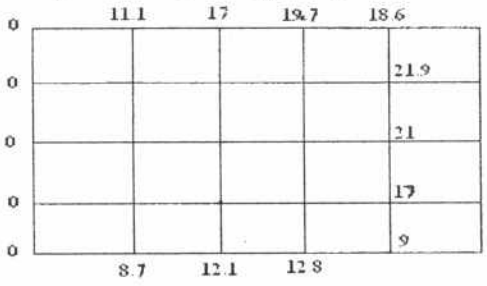
b. Using the method of separation of variables solve $\frac{\partial u}{\partial x}=2\frac{\partial u}{\partial t}+u$ where $u(x, 0) = 6e^{-3x}$ **(07 Marks)**

c. Solve $x^2(y-z)p+y^2(z-x)q=z^2(x-y)$ **(06 Marks)**

4 a. Derive one dimensional heat equation. **(07 Marks)**

b. Obtain D'Alembert's solution of wave equation $\frac{\partial^2 u}{\partial t^2}=c^2\frac{\partial^2 u}{\partial x^2}$ **(07 Marks)**

c. Solve the Laplace's equation $U_{xx} + U_{yy} = 0$ given that



(06 Marks)

PART – B

5 a. Using Newton-Raphson method find the real root of the equation $3x = \cos x + 1$ **(07 Marks)**

b. Solve the following system of equations using Gauss-Jordon method

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$ **(07 Marks)**

c. Find the largest eigen value and the corresponding eigen vector of the following matrix by using power method

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$ Take $(1, 0, 0)^T$ as initial eigen vector. Carry out four iterations. **(06 Marks)**

6 a. A slider in a machine moves along a fixed straight rod. Its distance x cm along the rod is given below for various values of the time t sec. Find the velocity and its acceleration when $t = 0.3$ sec.

t	0	0.1	0.2	0.3	0.4	0.5
x	30.13	31.62	32.87	33.64	33.95	33.81

(07 Marks)

b. Given the values of x and y

x :	1.2	2.1	2.8	4.1	4.9	6.2
y :	4.2	6.8	9.8	13.4	15.5	19.6

Find the value of x corresponding to $y = 12$ using Lagrange's technique. **(07 Marks)**

c. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using Weddle's rule taking 7 ordinates. **(06 Marks)**

7 a. Find the extremal of the functional $\int_0^1 [(y')^2 + 12xy]dx$ with $y(0)=0$ and $y(1) = 1$. **(07 Marks)**

b. Find the curve passing through the points $(x_1\ y_1)$ and $(x_2\ y_2)$ which when rotated about the x-axis gives a minimum surface area. **(07 Marks)**

c. Show that the geodesics on a plane are straight lines. **(06 Marks)**

8 a. Find the Z-transform of the following:

i) $(n + 1)^2$

ii) $5^n (3n + 5)$ **(07 Marks)**

b. Find the inverse Z-transform of $\frac{z^3 - 20z}{(z-2)^3(z-4)}$ **(07 Marks)**

c. Solve the difference equation $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ using Z-transforms. **(06 Marks)**

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06CS32

Third Semester B.E. Degree Examination, June-July 2009
Electronic Circuits

Time: 3 hrs. Max. Marks:100

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

Part A

1 a. Explain the working of positive clipper and negative clipper with circuit diagram. **(06 Marks)**

b. For the clipping circuit shown in figure, obtain the output voltage waveform assuming ideal diodes. Take $V_s = 40\sin\omega t$ **(06 Marks)**

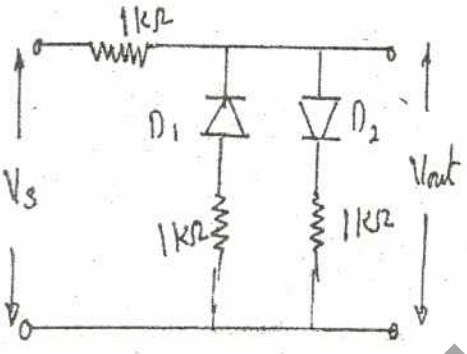

Fig. Q1 (b)

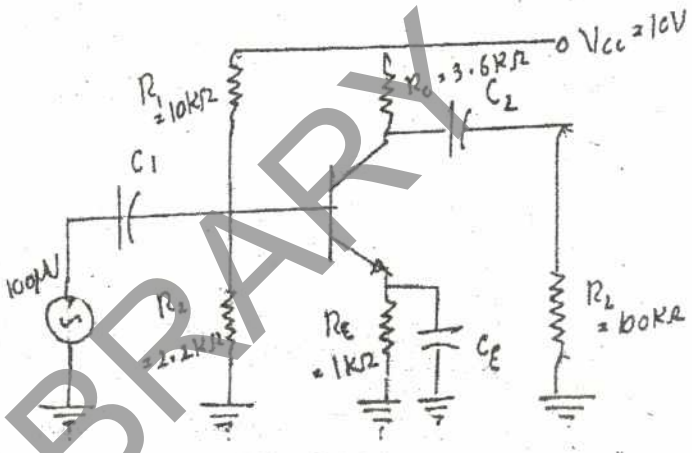

Fig. Q2 (a)

c. Explain the construction of SCHOTTKY diode along with its applications. **(08 Marks)**

2 a. Find the value of R_c for the voltage divider bias amplifier shown in fig Q2 (a). If the emitter resistance is doubled, what is the OC resistance of emitter diode? $V_{BE} = 0.7$ V **(10 Marks)**

b. For the VDB amplifier shown below, draw the DC equivalent circuit and find the DC quantities I_E, V_E, V_{CE} and V_C. **(10 Marks)**

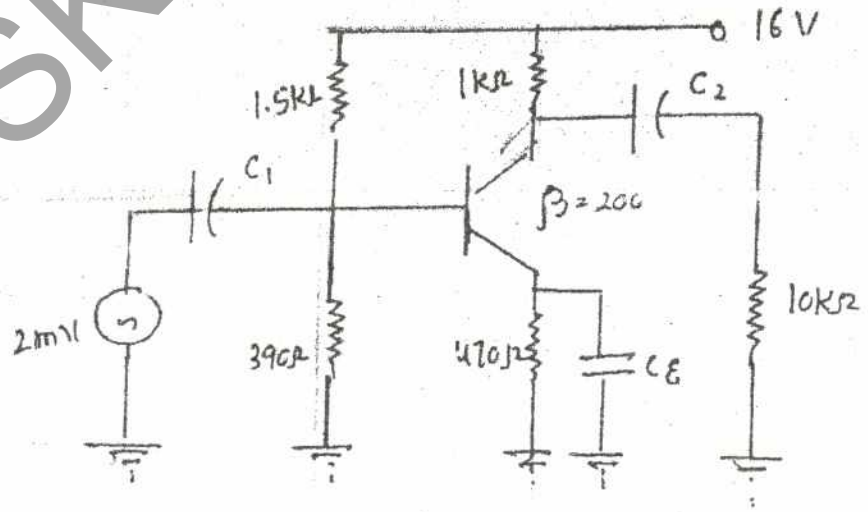

Fig. Q2 (b)

3 a. Explain, with the help of a circuit diagram, a two stage feedback amplifier. **(10 Marks)**

b. For the circuit shown below, calculate the value of output impedance. **(10 Marks)**

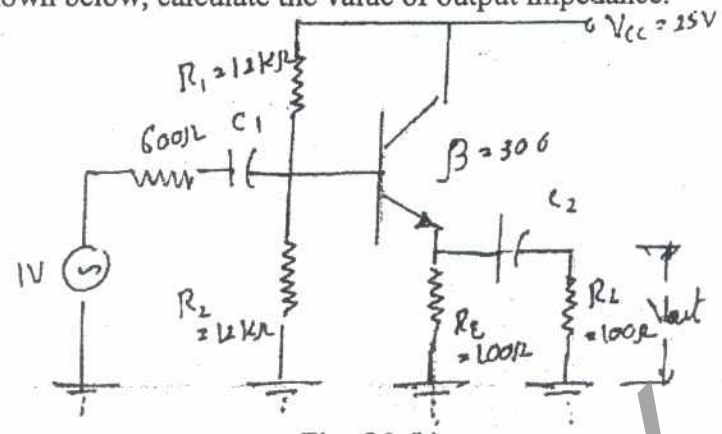

Fig. Q3 (b)

4 a. Explain the classification of amplifiers based on their operation. **(08 Marks)**

b. Show that the maximum efficiency of transformer coupled class a power amplifier is 50%. **(12 Marks)**

Part B

5 a. Explain the construction and principle of operation of enhancement mode MOSFET along with its drain and transconductance characteristics. **(10 Marks)**

b. Discuss in detail CMOS combiner n-channel and p-channel MOSFETs and hence explain CMOS power consumption. **(10 Marks)**

6 a. Discuss in detail the frequency response of AC and DC amplifier. **(10 Marks)**

b. Explain the various types of negative feedback amplifier. **(10 Marks)**

7 a. Explain with a neat diagram comparator with non-zero reference voltage for positive and negative references. **(10 Marks)**

b. Explain with a neat circuit diagram the operation of a monostable multivibrator. **(10 Marks)**

8 a. Explain the various characteristics for the quality and suitability of power supply depends. **(10 Marks)**

b. For the shunt regulator shown in figure, V_{in} = 12 V, R_s = 10 Ω, V_2 = 5.6 V, V_{BE} = 0.8 V, R_2 = 50 Ω, R_1 = 1 kΩ, R_2 = 330 Ω, calculate

i) the output voltage
ii) the input current
iii) the load current
iv) the collector current
v) the approximate efficiency. **(10 Marks)**

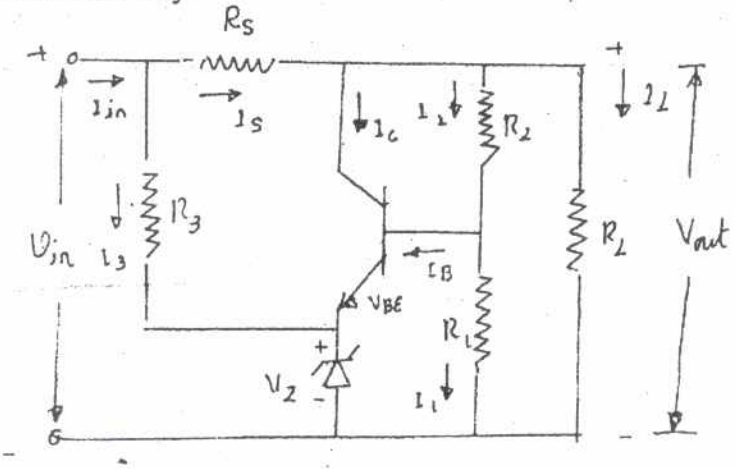

Fig. Q8 (b)

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06CS33

Third Semester B.E. Degree Examination, June-July 2009
Logic Design

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Write the truth table of the logic circuit having 3 inputs A, B & C and the output expressed as $Y = A\bar{B}C + ABC$. Also simplify the expression using Boolean Algebra and implement the logic circuit using NAND gates. **(06 Marks)**

b. What is the purpose of using an expander with an AND – OR – INVERT gate? Write a logic circuit of an expander driving expandable AND – OR – INVERT gate. **(04 Marks)**

c. Simplify the following logic expression using Karnaugh map and also by Quine – McClusky method.

$$f(A, B, C, D) = \sum m(1, 2, 8, 9, 10, 12, 13, 14)$$ **(10 Marks)**

2 a. Write the truth table of a 4-bit Binary to Gray code converter and realize the same using four 74151 ICs (8-to-1 multiplexer) **(10 Marks)**

b. Realize 7-segment decoder using PLA. **(06 Marks)**

c. Write Verilog code for a combinational logic circuit that compares two 4-bit numbers A and B and generates a 3-bit output Y. The 3 bits of Y represent A = B, A > B and A < B. **(04 Marks)**

3 a. Show the 8-bit subtraction of these decimal numbers in 2's complement representation
i) +68, – 43 ii) +16, – 38 **(04 Marks)**

b. What is a fast adder? Show how two IC 74283s can be connected to add two 8-bit numbers. **(06 Marks)**

c. What is an ALU? How A < B function is performed in IC 74181? Also, show how 7 can be subtracted from 13 using IC 74181. **(10 Marks)**

4 a. Draw carefully the waveforms at points A, B and C in Fig.4(a). **(06 Marks)**

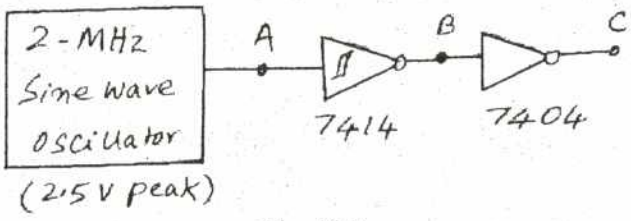

Fig.4(a)

b. Differentiate transparent and gated flip-flops. What are their applications? **(04 Marks)**

c. Show how to convert D flip-flop to JK flip-flop. **(10 Marks)**

PART – B

5 a. Name the four basic types of shift registers, and draw a block diagram for each. **(04 Marks)**

b. Draw the gates necessary to decode the 16 states of a mod-16 counter 7493. What are decoding glitches? How to eliminate them? **(10 Marks)**

c. What are presettable counters? What is lock out of a counter? Show how to construct a mod-13 counter using 74163 synchronous binary counter IC. **(06 Marks)**

6 a. Draw state transition diagram of a sequence detector circuit that detects '1101' from input data stream using both Mealy and Moore models. (1^{st} Data bit = 1, 2^{nd} data bit = 1, 3^{rd} Data bit = 0 and 4^{th} Data bit = 1). **(08 Marks)**

b. Design a parity generator using asynchronous sequential logic that gives output = 1 when it receives odd number of pulses and output = 0 if the number of pulses received is even. **(08 Marks)**

c. What are the problems with asynchronous sequential circuits? **(04 Marks)**

7 a. What is accuracy and resolution of the D/A converter? What is the resolution of a 12-bit D/A converter which uses a binary ladder? If the full-scale output is +10V, what is the resolution in volts? **(04 Marks)**

b. Find the following for a 12-bit counter-type A/D converter using a 1-MHz clock:
   i) Maximum conversion time
   ii) Average conversion time
   iii) Maximum conversion rate **(06 Marks)**

c. Explain successive approximation A/D converter. **(10 Marks)**

8 a. Draw the circuit for a CMOS inverter and explain its working. **(06 Marks)**

b. Discuss the features of High-speed TTL, Low-power TTL and Schottky TTL families. **(06 Marks)**

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

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06CS34

Third Semester B.E. Degree Examination, June-July 2009
Discrete Mathematical Structures

Time: 3 hrs. Max. Marks:100

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

PART - A

1 a. Define inverse, converse and contra positive of a conditional statement. **(06 Marks)**

b. Find the possible truth value p, q, and r if

i) $P \rightarrow (q \vee r)$ is FALSE

ii) $P \wedge (q \rightarrow r)$ is TRUE. **(06 Marks)**

c. By constructing truth tables

i) S.T. $[(p \vee q) \rightarrow r] \Leftrightarrow [(p \rightarrow r) \wedge (q \rightarrow r)]$

ii) Examine whether

$[(p \vee q) \rightarrow r] \leftrightarrow [\neg r \rightarrow \neg (p \vee q)]$ is a tautology. **(08 Marks)**

2 a. When is a conclusion q is said to follow from the premises $H_1, H_2, \ldots\ldots, H_n$?

Let p, q, r be the primitive statements

p : Ragu studies.

q : Ragu plays tennis.

r : Ragu passes in Discrete Mathematics.

Let H_1, H_2 and H_3 be the premises

H_1 : If Ragu studies, then he will pass in Discrete Mathematics.

H_2 : If Ragu does not play tennis, then he will study.

H_3 : Ragu failed in Discrete mathematics. Show that q follows from H_1, H_2 and H_3. **(08 Marks)**

b. Show that rvs follows from cvd, $cvd \rightarrow \neg h$, $\neg h \rightarrow a \wedge \neg b$ and $a \wedge \neg b \rightarrow r \vee s$. **(06 Marks)**

c. Let $p(x) : x \geq 0$

$q(x) : x^2 \geq 0$ and $r(x) = x^2 - 3x - 4 = 0$.

Then for the universe comprising of all real numbers, find the truth values of

i) $(\exists x)\ [p(x) \wedge q(x)]$

ii) $(\forall x)\ [p(x) \rightarrow q(x)]$

iii) $(\exists x)\ [p(x) \wedge r(x)]$. **(06 Marks)**

3 a. Define the power set of a set. Obtain all the power sets of A_2 { 1, 2, 3, 4 }. **(04 Marks)**

b. For any sets A and B prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$. **(06 Marks)**

c. Prove that $\frac{1^2 + 3^2 + 5^2 + \ldots\ldots + (2n-1)^2}{3} = \frac{n(2n+1)(2n-1)}{3}$ by mathematical induction. **(04 Marks)**

d. A Computer services company has 300 Programmers. It is known that 180 of these can program in Pascal, 120 in FORTRAN, 30 in C++, 12 in Pascal and C++, 18 in FORTRAN and C++, 12 in Pascal and FORTRAN and 6 in all three languages.

i) If a programmer is selected at random, what is the probability that she can program in exactly two languages?

ii) If two programmers are selected at random, what is the probability that they can both program in Pascal? **(06 Marks)**

4 a. State the pigeon hole principle. If five coloures are used to paint 26 doors, show that at least six doors will have the same colour. (06 Marks)

b. Solve $a_n - 5a_{n-1} + 6a_{n-2} = 0$ where $a_0 = 2$ and $a_1 = 5$ by characteristic root method. (06 Marks)

c. For the Fibonacci sequence show that: $F_n = \left[\left(\frac{\sqrt{5}+1}{2}\right)^n - \left(\frac{\sqrt{5}-1}{2}\right)^n\right]$. (08Marks)

PART - B

5 a. Define a matrix and digraph of a relation with example. (04 Marks)

b. Show that congruence modulo m is an equivalence relation. (06 Marks)

c. If A = { 1, 2, 3, 4 }, B = { 2, 5 } and C = { 3, 4, 7 }, determine (AUB) x C and A x (BUC). (04 Marks)

d. Let R = {(1, 1), (1, 2), (2,3), (3, 3), (3, 4)} be a relation on A = { 1, 2, 3, 4 }.
   i) Draw the graph of R.
   ii) Obtain R^2 and draw graph of R^2. (06 Marks)

6 a. Define a Stirling's Number of second kind. (06 Marks)

b. Let A = { 1, 2, 3, 4, 5, 6, 7 } and B = { w, x, y, z }. Find the number of on to functions from A to B. (06 Marks)

c. Define the partition of a set. If R = { (1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 3), (3, 3), (4, 4) } defined on the set A = { 1, 2, 3, 4 }, determine the partition induced. (08 Marks)

7 a. Define an Abelian group with examples. (08 Marks)

b. Define homomorphism and isomorphism. (04 Marks)

c. If G is a cyclic group, then show that:
   i) If G is of infinite order, then G is isomorphic to (2, +).
   ii) If G is finite order with $|G| = n$, then G is isomorphic to (2n, +). (08 Marks)

8 a. Define :
   i) Ring with unity
   ii) Ring with two divisor. (04 Marks)

b. Prove that set Z with binary operation $\oplus$ and $\odot$ defined by
   $x \oplus y = x + y - 1$
   $x \odot y = x + y - xy$, is a commutative ring with unity. (10 Marks)

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

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06CS35

Third Semester B.E. Degree Examination, June-July 2009
Data Structures with C

Time: 3 hrs. Max. Marks:100

Note : *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Assume missing data if any.

PART - A

1 a. What is a pointer variable? Can we have multiple pointer to a variable? Explain Lvalue and Rvalue expression. **(06 Marks)**

b. Write a note on dynamic memory allocation. **(08 Marks)**

c. Show the output of the following block.

```
Main ( )
{
        int num [5] = {3, 4, 6, 2, 1}
        int * p = num;
        int * q = num+2;
        int * r = & num [1];
        printf ("\n %d %d", num[2], *(num+2));
        printf ("\n %d %d", * p, *(p+1));
        printf ("\n %d %d", * q, *(q+1));
        printf ("\n %d %d", * r, *(r+1));
}
```

(06 Marks)

2 a. What is a structure? How it is different from array? Explain different types of structure declaration with examples and its initialization. **(08 Marks)**

b. Write a function that accepts a string and returns 1 if the string is palindrome else '0' if string is not a palindrome without using any built in function. **(06 Marks)**

c. Write a note on fseek ( ) and ftell ( ) functions. **(06 Marks)**

3 a. What is a stack? List and Implement basic operation in stack using C. **(10 Marks)**

b. Write an algorithm to evaluate a postfix expression. Trace the same algorithm with stack contents for the following expression A B C + * C B A - + * with A = 1, B = 2 , C = 3. **(10 Marks)**

4 a. Define recursion. Write a recursive function for computing n^{th} term of a Fibonacci sequence. Hence give the trace of stack contents for n = 4. **(10 Marks)**

b. What is a circular queue? Write implementation of circular queue using array. Also write following routine of circular queue.
i) Insertion ii) Deletion iii) Display. **(10 Marks)**

PART - B

5 a. What is linked list? With a neat diagram show how an element is added and removed from the front end of the list. **(10 Marks)**

b. What is a Header node? Give example with neat diagram. **(04 Marks)**

c. Write a C function insend (plist, x) to insert the element 'x' at the end of the list 'list'. **(06 Marks)**

6 a. List out the advantages and disadvantages of doubly linked list over singly linked list. **(04 Marks)**

b. Write a program to insert a given value into an ordered doubly linked list into its proper position. **(06 Marks)**

c. Write a C program to perform following operation

i) Create a list adding nodes at front

ii) Delete a node at given position. **(10 Marks)**

7 a. Define following terms : i) Binary tree ii) Strictly binary tree iii) Complete binary tree iv) Almost complete binary tree. **(08 Marks)**

b. Write a C routine to construct a binary search tree and check for duplicate data. Draw binary search tree constructed for following input.
14, 5, 6, 2, 18, 20, 16, 18, -1, 21. **(12 Marks)**

8 a. Draw a binary tree for the following expression 3 + 4 * (6 – 7) / 5 + 3. Traverse above constructed tree using pre order and post order. **(06 Marks)**

b. Write a C function that accepts a pointer to a binary tree and a pointer to a node of the tree and returns the level of the node in the tree. **(06 Marks)**

c. What do you mean by a threaded binary tree? Discuss the impact of such a representation on tree traversal procedure. **(08 Marks)**

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06CS36

Third Semester B.E. Degree Examination, June-July 2009
Unix & Shell Programming

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, explain the architecture of UNIX, clearly bringing out the division of labor between kernel and shell. **(08 Marks)**

b. Write a note on man documentation. Also give the usage of apropos and what is. **(06 Marks)**

c. Explain the different types of files in UNIX. **(06 Marks)**

2 a. What is file permission? What are the different ways of setting file permission? Explain. **(08 Marks)**

b. With suitable examples, bring out the difference between absolute and relative pathnames. **(06 Marks)**

c. What is a process? Explain the mechanism of process creation. **(06 Marks)**

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

b. With a neat diagram, explain different modes of operation of vi editors. Also give the internal commands available in each mode. **(08 Marks)**

c. Differentiate between hard link and soft link with examples. **(06 Marks)**

4 a. What is a job? Describe different job control facilities with suitable examples. **(09 Marks)**

b. Use find command to locate from your home directory

i) all files with the extension .html
ii) all files having inode number 9076
iii) all directories having permissions 666
iv) all files not accessed for more than a year
v) all but the C program files. **(05 Marks)**

c. Explain the following commands with examples:

i) pr ii) sort iii) uniq **(06 Marks)**

PART – B

5 a. With suitable examples, explain the grep command and its various options. **(08 Marks)**

b. Explain line addressing and context addressing in sed with examples. **(06 Marks)**

c. Explain different ways of using test statement, with examples. **(06 Marks)**

6 a. Give the syntax of for statement in shell. Explain the possible sources of list in for statement. **(08 Marks)**

b. Write a shell script that accepts a word and five filenames as arguments, counts and reports the occurrence of the word in each of the files. **(06 Marks)**

c. Write a shell script to find the smallest of three numbers that are read from keyboard. **(06 Marks)**

7 a. With suitable examples, explain the if and while statements in awk. **(06 Marks)**

b. Explain the following built-in functions in awk.

i) split( ) ii) substr( ) iii) length( ) iv) index( ) **(08 Marks)**

c. Write a note on operators and expressions in awk. **(06 Marks)**

8 a. Explain file handling in perl. **(06 Marks)**

b. Perl offers a grand superset of all possible regular expressions in UNIX. Discuss. **(08 Marks)**

c. Explain the following perl features.

i) $_ ii) foreach iii) join **(06 Marks)**

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