This question paper contains 4+2 printed pages]

Your Roll No. .....

1977

B.Sc. (Hons.) (Computer Sc.)/III Sem. C

Paper 302—SYSTEM SOFTWARES

(Admissions of 2001 and onwards)

Time : 3 *Hours* *Maximum Marks* : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *All* questions.

Section I

1. (*a*) State the purpose of each of the following commands : 5

(*i*) diff

(*ii*) pwd

(*iii*) mv

(*iv*) ln oldfile newfile

(*v*) ps.

P.T.O.

(b) Given the following pending requests for I/O operations from cylinders—86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Assume the drive is currently serving a request at cylinder 154 and the previous request was 120. What is the total number of head movement made by C-LOOK algorithm. 3

(c) Explain the working of interrupt driven I/O. 5

(d) Explain briefly (i) Trojan Horse and (ii) Trap Door 3

(*b*) Write the output of the following : 15

(*i*) who ' wc –l

(*ii*) echo PATH is $PATH

(*iii*) grep you'etc/passwd

(*iv*) ls -l file 1 awk '{print substr($1, 2, 10)}'

(*v*) chmod 666 file2.

(*c*) Assume that a file test is available in the current directory and has the following contents : 2

great fleas have little fleas,

upon meir backs to bite'em.

and little fleas have lesses fleas,

and so ad infinitum.

Give a command to list lines that :

(*i*) have the word 'fleas' in them.

(*ii*) do not have the word 'fleas' in them.

Page No.	0	1	2	3	4	5	6	7
Frame No.	2	4	6	15	30	3	28	20

(b) Why do we use hierarchical page table structure ? 4

(c) Consider a paging system with the page table stored in memory. If a memory reference takes 120 nanoseconds, how long does a paged memory reference take ? If we add associative registers, and 90% of all page-table references are found in the associative registers, what is the effective memory reference time ? (Assume that finding a page-table entry in the associative registers takes 10 nanoseconds time, if the entry is there.) 1 + 2

(d) Consider the following page reference string :

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur if (i) LRU and (ii) optimal page replacement algorithms are used. Assume four frames are available and all are initially empty. 6

5. (a) What is the combined scheme for maintaining index blocks in indexed allocation of files ? What is an inode in Unix operating system ? 5 + 2

2. (*a*) What are inodes ? What purpose do they serve ? 3

(*b*) Write a shell script to input a number from the command line and perform the following : 3

(*i*) If the commandline arg is not provided show an error and exit.

(*ii*) If the number is even, show the message : "is even".

(*iii*) If the number is odd, store it in a file; file3.

(*c*) Write commands or shell script to concatenate files filex and filey and append the output to file filez. 2

3. (*a*) Write a sed script which inserts a blank line after each line of text of the input file. 2

(*b*) Write a code using awk to print only the odd numbered lines of a file. 3

Section II

4. (*a*) Write down the functions of the two passes of a simple assembler. 5

(*b*) What is dynamic linking ? 2

(b) Show that if wait and signal operations are not executed atomically then mutual exclusion may be violated ? 4

(c) Draw the resource allocation graph for the following situation and find if there is a deadlock ? 4

P = {P1, P2, P3, P4}

R = {R1, R2, R3, R4}

E = {P1 → R1, R1 → P2, R2 → P1, R2 → P2, P2 → R3, R3 → P3, P3 → R2, P4 → R4}

Resource	No. of instances
R1	1
R2	2
R3	1
R4	3

4. (a) Consider logical address space of 8 pages of 1024 words each, mapped on to physical memory of 32 frames. 1 + 1 + 4

I. How many bits are there in the logical address ?

II. How many bits are there in the physical address ?

III. Convert the logical address 1010001010011 to corresponding physical address using the given page table.

(c) Describe the following : 4

(i) Bit mask FEC

(ii) Modification record M, 000014,05.

5. (a) Instructions in one control section may need to to refer data or instructions in another control section. Which two assembler directives are used to achieve this ? Discuss the role of each. 4

(b) Describe the function of absolute loader. 3

6. Give the output of the following LEX generator program : 4

```
digit [0–9]

letter [A–Za–z]

%{

        . int account, bcount;

}%

%%

{digit}({digit})*

{letter}({letter}|{digit})*

%%
```

2. (a) What is meant by scheduling queues ? Explain with the help of scheduling queue diagram. 2 + 2

(b) Why are kernel level threads more efficient than user level threads ? Name two applications which uses multi-threading. 2 + 2

3. (a) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds : 10

Process	Arrival time	Burst Time
P1	0	10
P2	4	8
P3	6	6
P4	6	3

I. Draw Gantt charts illustrating the execution of these processes using non-preemptive SJF and preemptive SJF.

II. What is the average turnaround time for each of the scheduling algorithms ?

III. What is the average waiting time for each of the scheduling algorithms ?


```
int main (void) {

    yylex();

    printf("%d\t %d", acount, bcount);

    return 0;

}
```

The input file has data :

55 and 78 is 133

12 added to the sum gives 135

Should it not give 200.

Section III

7. Write an XML file with the root tag library. Design 3 book tags within the root, each with an attribute isbn. Each book tag has child elements name, author and publisher. 6

8. Give the output of the following perl program : 3

```
@list = ("black", "white", "orange", "red", "yellow");

print ("the list contains : @ list\n");

print("the list contains", @list, "\n");

print("$list[1]");
```

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B.Sc. (Hons.) Computer Science/IV Sem.

Paper 401—OPERATING SYSTEMS

(Admissions of 2001 and onwards)

Time : 3 *Hours* *Maximum Marks* : 75

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Attempt all questions.

All parts of a question must be answered together.

1. (a) Differentiate between the following : 2*3 = 6

(i) Symmetric multiprocessing and Asymmetric multiprocessing

(ii) Interrupt and Trap

(iii) Message Passing and Shared Memory Model of Inter Process Communication.

(b) Why do hard real time systems not have virtual memory ? 2

(c) How does dual mode operation of computers help in providing CPU protection ? With which Intel processor dual mode operation was introduced ?