



Sl. No. of Ques. Paper : 7090  
Unique Paper Code : 2341601  
Name of Paper : Microprocessors  
Name of Course : B.Tech. (Computer Science) (Erstwhile FYUP)  
Semester : VI  
Duration : 3 hours  
Maximum Marks : 75

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

**Attempt all questions from Section A and any four questions from Section B.**  
**Attempt all parts of a question together.**

### Section A

- Q1.(a) In the real mode, determine the starting and ending address of stack memory if the stack segment register holds the value 1234H 3
- (b) What are program invisible registers? What is the purpose of GDTR? 3
- (c) What is the purpose of granularity bit? 3
- (d) The 8086 LOOP instruction decrements a register and tests it for a 0 to decide if a jump occurs. Name the register. Also perform the same task using conditional jump. 3
- (e) Contrast the operation of JMP [DI] with a JMP FAR PTR [DI]. 3
- (f) Explain the function of RET instruction. 3
- (g) List the differences between the 8086 and the 8088 microprocessors. 3
- (h) Evaluate the address lines and data lines required to map 32K x 8 memory. 3
- (i) What is the purpose of the OE pin on a memory device? 3
- (j) Design a Control Word for 82C55 to set Port A as Input Port, Port B as Output Port in Mode 0 operation. 3
- (k) The instruction MOV AL, [2000H] is used to access a peripheral. Comment on the kind of peripheral and the width of its data lines. 3
- (l) Which microprocessor pin and its status forces it to go into wait state? 2

### Section B

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- Q2.(a) In the protected mode of memory addressing, what are the three fields of information the selector register holds? If the data segment register holds 000DH, what does it signify? 4
- (b) Explain with example the instruction LDS BX,[DI]. 4
- (c) What does the instruction STOS do? 2
- Q3.(a) Identify the addressing mode of each of the following instructions: 4
- (i) MOV AL, [1234H] contains?
- (ii) MOV EAX, [BX]
- (ii) MOV EAX, [BP + 200H]
- (iii) MOV DH, [EBX + 4\*EAX + 1000H]
- (b) Consider the instruction JMP [10000H] and given that opcode for far jump instruction is EA, write the 5-byte machine language version of the instruction. 4
- (c) What are the default segment registers assigned to DI and BP registers? 2
- Q4.(a) Develop a sequence of instructions that copy 12 bytes of data from an area of memory addressed by SOURCE into an area of memory addressed by DEST. 4
- (b) Describe the operations of PUSHFD. Let the current value of SP=1000H. What will be the value of SP after the PUSHFD instruction is executed? 4
- (c) Which flag bit is tested by JA instruction? 2
- Q5.(a) Explain the READ operation with the help of bus timing cycle. 4
- (b) Explain the function of the microprocessor pins: ALE, S<sub>4</sub>, S<sub>3</sub> and DEN. 4
- (c) A 15MHz crystal is attached to the 8284A clock generator, what is the operating frequency of the 8086 microprocessor? 2
- Q6.(a) Design a decoder circuit to map F4000-F5FFF on 8K x 8 memory 4
- (b) Write the control word for the 8254 interval timer and explain it. 4
- (c) Why does 8086 need two memory banks? 2
- Q7(a) Explain the interrupt instructions BOUND and INTO. 4
- (b) Explain how the 8237 DMA controller performs the read and write operations. 4
- (c) How and when is the NMI interrupt requested? 2



[This question paper contains 6 printed pages.]

Sr. No. of Question Paper : 7091

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Your Roll No.....

Unique Paper Code : 2341602

Name of the Paper : System Programming and Compiler Design

Name of the Course : B.Tech. (Computer Science)

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. The Question paper consists of two sections.
3. **Section A** is compulsory.
4. Attempt any **four** questions from **Section B**.

**SECTION A**

1. (a) List the major data structures used during assembly process. Explain the structure of any one of them. (3)  
(b) Give disadvantages of a single pass assembler over two-pass assembler. (2)
2. (a) Differentiate between static and shared libraries. (3)  
(b) What is the difference between a compiler and an interpreter? (2)
3. Describe the languages denoted by the following regular expressions  
(a)  $0(0|1)^*0$

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 (b)  $((\epsilon|0)1^*)^*$ 

 (c)  $(0|1)^*0(0|1)(0|1)$ 

(1+2+2)

4. Write the actions of an LR parse for the following string, for the grammar and parse table shown below :

aalbbbb

Grammar :

 (1)  $S \rightarrow A$ 

 (2)  $S \rightarrow B$ 

 (3)  $A \rightarrow a A b$ 

 (4)  $A \rightarrow 0$ 

 (5)  $B \rightarrow a B bb$ 

 (6)  $B \rightarrow 1$ 

State	ACTION					GOTO		
	a	b	0	1	\$	S	A	B
0	S1		S2	S3		11	4	5
1	S1		S2	S3			6	7
2		r4	r4		r4			
3	r6	r6	r6	r6	r6			
4	r1	r1	r1		r1			
5	r2	r2	r2	r2	r2			
6		S8						
7		S9						
8		r3						
9		S10						
10		r5			r5			
11					acc			

Symbols used in the above table have their usual meaning.

(5)

5. (a) What are the advantages of LALR over Canonical LR parsers ?

(2)

(b) Differentiate between synthesized and inherited attributes.

(3)



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6. What do you mean by Intermediate code generation ? List various intermediate code generation schemes. (2+3)
7. Briefly explain the structure of an activation record. (5)

### SECTION B

8. (a) Given the following section tables for two object files a.obj and b.obj, explain the linking process and show the layout of the final executable module. (7)

Name	Size	Align
.text	200	16
.data	60	4
.data1	75	4

Section Table for a.obj

Name	Size	Align
.text	100	16
.data	155	4
.data2	300	4

Section Table for b.obj

- (b) Briefly explain the Intel hex format for storing object files. (3)
9. (a) What is relocation? Explain the different ways by which an assembler can pass relocation information to the linker. (3)
- (b) Assume the following description :

Token	Informal Discription
if	characters i, f
else	characters e, l, s, e
comparison	<or> or <= or >= or == or !=
id	letter followed by letters and digits
number	A numeric constant
literal	anything but ", surrounded by " 's
Ass_op	=

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Generate the appropriate tokens, lexemes and attribute values for every token that can be generated for the following c++ code fragment :

```
if (x<y)
    c=10;
else
    c=20;
```

(7)

10. Consider the following context-free grammar :

$$S \rightarrow Sa$$
$$S \rightarrow bS$$
$$S \rightarrow c$$

(i) Write the canonical collections of LR(1) items for this grammar. (6)

(ii) Identify all conflicting items, and the types of the conflicts. (4)

11. (a) What are the differences between Panic mode error recovery and Phrase level error recovery in LR parsing ? (3)

(b) Consider the following grammar :

$$S \rightarrow S S +$$
$$S \rightarrow S S *$$
$$S \rightarrow a$$

Show by constructing a SLR parsing table whether the above grammar is SLR or not. (7)

12. (a) Translate the arithmetic expression  $a*(b+c)$  into :

(i) Quadruples

(ii) Triples

(iii) Indirect triples (6)



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(b) Write type expressions for the following :

- (i) A two-dimensional array of integers (i.e., an array of arrays) whose rows are indexed from 0 to 9 and whose columns are indexed from -10 to 10.
- (ii) Functions whose domains are functions from integers to pointers to integers and whose ranges are records consisting of an integer and a character. (2+2)

13. (a) Consider the following Syntax directed Definition :

PRODUCTION	SEMANTIC RULES
1) $T \rightarrow F T'$	$T'.inh = F.val$ $T.val = T'.syn$
2) $T' \rightarrow * F T'_1$	$T'_1.inh = T'.inh \times F.val$ $T'.syn = T'_1.syn$
3) $T' \rightarrow \epsilon$	$T'.syn = T'.inh$
4) $F \rightarrow \text{digit}$	$F.val = \text{digit.lexval}$

Draw an annotated parse tree for the string : 9\*6\*7 (4)

(b) Show the stack with all activation record instances, including all the links, when execution reaches position 1 in the following skeletal program. (6)

```

void f3()
{
    ....
}
void f2()
{
    ....
    f3(); → →(1)
    ...
  
```

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```
}  
void f1()  
{  
    ....  
    f2();  
    ...  
}  
void main()  
{  
    ....  
    f1();  
    ...  
}
```

(2000)