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Your Roll No.

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B.Sc. Prog. / II

AS

COMPUTER SCIENCE – PAPER II

CS-202 : Computer System Architecture

(Admissions of 2005 and onwards)

Time : 3 hours

Maximum Marks : 75

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

All questions are compulsory.

1. (a) Simplify the Boolean function F using K-map in sum of product form. Draw the logic map with NAND gates:

$$F(w, x, y, z) = \sum(0, 1, 2, 4, 5, 6, 8, 12). \quad 6$$

- (b) Verify using Boolean Algebra:

$$(X+Y)(X+Z) = X+YZ \quad 3$$

2. (a) Construct a T flip-flop using:

- (i) D flip-flop
(ii) JK flip-flop

Use Block diagram. 2

- (b) Differentiate between:

(i) State table and Excitation table.

(ii) Sequential and Combinational circuit. 6

3. (a) Explain the selective mask, selective complement and selective clear operations. Compute the contents of register A after each operation, if contents of register A before operation = 1100 and contents of register B (logic operand) = 1010. 6

(b) What is a Multiplexer? Construct a 16-to-1 line multiplexer with two 8-to-1 and one 2-to-1 line multiplexers. 4

4. (a) What do you understand by a 'Program interrupt'? Draw flowchart for interrupt cycle for the basic computer. 2+4

(b) What is the use of BSA instructions List the sequence of micro operations for it. 2+3

5. (a) Perform arithmetic operations:

(i) $(-7)_{10} + (21)_{10}$ using two's complement.

(ii) $(-625)_{10} + (731)_{10}$ using ten's complement.

3+3

(b) What is Overflow? Give an example to show how it is detected. 4

- (c) Represent the number 1101.1101 in normalised floating point representation with 16 bits. The normalised fraction mantissa has 9 bits and the exponent has 7 bits. 2
6. (a) What is the Priority Interrupt? Explain the concept of Daisy-Chaining Priority. 4
- (b) Why is there a need of I/O interface? Draw block diagram of DMA controller. 2+3
- (c) Briefly explain the terms:
- (i) Hit ratio
 - (ii) Bootstrap loader
 - (iii) Dynamic RAM
 - (iv) Interrupt-initiated I/O. 8
7. (a) What is a Zero-Address instruction? Where is it used? Give example. 4
- (b) A computer uses a memory unit with 64K words of 24 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of the 32 registers and an address part.
- (i) How many bits are there in the operation code, the register code part and the address part?

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This question paper contains 4 printed pages.

(ii) How many bits are there in the data and address inputs of the memory? 4

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