This question paper contains 4 printed pages.

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Your Roll No. .....

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:

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

(*b*) Verify using Boolean Algebra:

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

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

(*i*) D flip-flop

(*ii*) JK flip-flop

Use Block diagram. 2

(*b*) Differentiate between:

P. T. O.

(*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?

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