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RN-6871

B. E. III (Sem. V) (Mech.) Examination

May / June – 2010

Elements of Mechatronics

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 5) (Mech.)**

Name of the Subject :

☛ **Elements of Mechatronics**

☛ Subject Code No. : **6 8 7 1** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt **all** the questions.

(3) Use **seperate** answer-book for **each** section.

(4) Figures to the **right** indicate **full** marks.

(5) Assume **suitable data** with proper justification.

SECTION - I

1 Attempt any **four** : **20**

(a) Explain data transfer group instructions.

(b) Explain the PIN detail of the 8085 microprocessor.

(c) Draw and explain the J-K flip-flop.

(d) What is BUS ? Explain address and system bus.

(e) What is Full-Adder ? Write truth-table for a full adder and develop its logic circuit.

(f) Explain compiler and assembly language.

2 Attempt any **four** : **20**

(a) Implement a full adder circuit with decoder and two OR gates.

$$S(x,y,z)=\sum(1,2,4,7)$$
$$C(x,y,z)=\sum(3,5,6,7)$$

(b) (i) Convert decimal 153 to octal

(ii) Convert $(0.513)_{10}$ to octal

(iii) Convert decimal 41 to binary

(c) Explain the terms :

INR,

EPROM,

ALU,

CPU,

ORA.

(d) Simplify the following Boolean functions to a minimum number of literals :

(i) x+x'y

(ii) x(x'+y)

(iii) x'y'z+x'yz+xy'

(iv) xy+x'z+yz

(v) (x+y) (x'+z) (y+z).

(e) (i) Use 9's complement to perform M-N with the given binary numbers.

M=03250

N=72532.

(ii) Use 1's complement :

M=1010100

N=1000100.

3 (a) Fill in the blanks : 4

(1) ROM stands for _____.

(Read on memory, Read off memory, Read only memory)

(2) Byte is group of _____. (04, 08, 16)

(3) Combinational circuit contains _____. (No memory, memory)

(4) The relationship between α and β in transister is $\beta =$ _____. $\left(\frac{\alpha}{1-\alpha}, \frac{\alpha}{1+\alpha}, \frac{1+\alpha}{x}\right)$

(b) Attempt following : 3

(1) What is function of compiler.

(2) Draw symbol of X-OR gate.

(3) How to find (r-1)'s complement of any number ?

(c) Explain the following istructions in brief : 3

(1) MVI

(2) ADC.

SECTION - II

4 (a) Explain key elements for mechatronics system. 10

(b) Answer following : (any **five**) 20

(1) What is solenoid ? How does it work?

(2) Explain in brief muliplexure and decoder.

(3) Explain capacitence transducer.

(4) Explain piezo-electric transducer.

(5) Explain radiative temperature sensing.

(6) Explain fiber optic devices.

5 Any **two** : **16**

(1) Explain with neat sketch working of at least three pneumatic motors.

(2) Explain DC motor and mathematical model of D.C.Motor.

(3) Explain drive equation and block diagram model.

6 Explain gear-pump. **4**
