



SE-6871

B. E. III (Sem. V) (Mech.) Examination
April / May – 2011
Elements of Mechatronics

Time : 3 Hours]

[Total Marks : 100

Instruction :

(1)

नीचे दशांशके निशान्तीवाणी विगतो उत्तरवडी पर अवश्य लभवी. Fillup strictly the details of signs on your answer book.		Seat No. :	
Name of the Examination :		<input type="text"/>	
B. E. - 3 (Sem. 5) (Mech.)		<input type="text"/>	
Name of the Subject :		<input type="text"/>	
Elements of Mechatronics		<input type="text"/>	
Subject Code No. :		Section No. (1, 2,.....) :	
6 8 7 1		1&2	
		Student's Signature	

- (2) Answer all the questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data with proper justification.

SECTION - I

- 1 Attempt any **four** : **20**
- (a) Explain compiler and assembly language.
(b) What is full adder ? Write truth-table for a full adder and develop it's logic circuit.
(c) What is BUS ? Explain address and system bus ?
(d) Draw and explain the J.K. flip-flop.
(e) Explain the PIN detail of 8085 micro-processor.
(f) Explain data transfer group instructions.
- 2 Attempt any **four** : **20**
- (i) (a) Convert decimal 153 to octal.
(b) Convert $(0-513)_{10}$ to octal.
(c) Convert decimal 153 to octal.
(ii) Explain the terms :
INR, EPROM, ALU, CPU, ORA.

- (iii) Implement a full adder circuit with decoder and two OR gates :

$$S(x,y,z) = \sum(1, 2, 4, 7)$$

$$C(x,y,z) = \sum(3, 5, 6, 7)$$

- (iv) (a) Use 9's complement to perform M-N with the given binary numbers.
M=03250 and N=72532.
- (b) Use 1's complement
M=1010100 and N=1000100.
- (v) Simplify the following Boolean functions to a minimum number of intervals :
- (a) $x+x'y$
- (b) $x(x'+y)$
- (c) $x'y'z + x'yz + xy'$
- (d) $xy + x'z + yz$
- (e) $(x+y)(x'+z)(y+z)$

- 3 (a) Fill in the blanks : 4
- (1) Combinational circuit contains _____.
(No memory, memory)
- (2) The relationship between α and β in transistor is
- $$\beta = \frac{\alpha}{1-\alpha} \quad \left(\frac{\alpha}{1+\alpha}, \frac{\alpha}{1+\alpha^2}, 1+\alpha \right)$$
- (3) Byte is group of _____. (04, 08, 16)
- (4) ROM stands for _____.
(Read only memory, read off memory, read on memory)
- (b) Attempt following : 3
- (1) How to find (r-1)'s complements of any number ?
- (2) What is function of compiler ?
- (3) Prove symbol for X - OR gate.
- (c) Explain the following instructions in brief : 3
- (1) MVI
- (2) ADC.

SECTION - II

- 4 (a) Answer the following : 10
- (1) Briefly illustrate the advantages of mechatronics approach to system design over the traditional approach.
 - (2) What is directional control valve ? Draw 4 port and 3 position direction control valve.
- (b) Attempt any **four** : 20
- (1) Limited rotation actuators.
 - (2) Opto coupler.
 - (3) Thermister.
 - (4) Pneumatic actuators
 - (5) Piezoelectric transducers
 - (6) Capacitive transducer.
- 5 Answer the following :
- (a) What is the role of sensors in mechatronics product ? 6
Explain with suitable example.
- OR**
- (a) Give complete classification of electric motor. Explain 6
with neat sketch working of D.C. motor.
- (b) Explain the following terms with reference to semiconductor diodes :
- (1) Breakdown voltage
 - (2) Depletor region
 - (3) Knee voltage.
- 6 Explain any one : 5
- (a) What is a solenoid ? How does it work ?
 - (b) Explain directional control valve.
 - (c) Explain working of resistance strain gauge.
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