Total No. of Questions :5] *[Total No. of Printed Pages . 2*

Roll No .....

EC-504

B.E. V Semester

Examination, December 2016

Microprocessors and Microcontrollers

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each question are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What is the purpose of queue in the BIU of the 8086 Microprocessor?
   b) What are the advantages of segmentation of memory of 8086 microprocessors?
   c) Draw and explain the CLK generator circuitry.
   d) What is the function of flag register? Describe in detail the flag register of the microprocessor 8086.

   OR

   Draw and explain the configuration of the microprocessor 8086 in minimum mode.

Unit-II

2. a) What is displacement? Explain by giving suitable example.
   b) What is the role of bus arbiter in a multiprocessor system? What are its modes of operation?
   c) What are the different data types supported by the numeric data processor 8087? Give their ranges with examples.
   d) Draw and explain the architecture of the math coprocessor.

   OR

   Draw the functional block diagram of 8089 I/O processor and discuss briefly.

Unit-III

3. a) Explain the bit set reset mode of the programmable peripheral interface 8255.
   b) Enlist and explain the different modes of operation of programmable interval timer 8253.
   c) Explain what is encoded scan and decoded scan.
   d) Explain the mode word and command word registers of the 8251 USART.

   OR

   Draw the internal architecture of 8275 CRT controller and discuss briefly.

Unit-IV

4. a) Explain the differences between the software and hardware interrupts.
   b) What is the importance of DMA controller? Explain the various types of DMA modes?
   c) Explain the complete register organization of 8257 DMA controller.
   d) Draw the architecture of the 8259 interrupt controller and explain the facilities available.

   OR

   In a state with the flow chart initialization of the 8259 PIC, what are the maximum and minimum requirements of the (ICW's).

Unit-V

5. a) Explain why the data pointer (DPTR) is 16 bit wide and the stack pointer is 8 bit wide in 8051 microcontroller?
   b) State and explain the addressing modes used in each of the following instructions :
      i) MOV A, # 25H ii) MOV R2, 40H
   c) What are the advantages of microcontrollers over microprocessors?
   d) Explain the register organization of 8051 microcontroller.

   OR

   Explain interrupt structure of the 8051 microcontroller. Explain two level interrupt priority. If two requests of interrupts are received simultaneously, how are these handled by the 8051.

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A transmission shaft of cold drawn steel 27Mn2 (S_{ut} = 500 N/mm^2 and S_{yt} = 300 N/mm^2) is subjected to a fluctuating torque which varies from – 100 Nm to + 400 Nm. The factor of safety is 90%. Neglecting the effect of stress concentration, determine the diameter of the shaft. Assume the distortion energy theory of failure.

2 a) What is the Function of Transmission shaft?

b) What do you understand by torsional rigidity?

c) What are the advantages of hollow shaft over solid shaft?

d) A solid shaft of diameter ***d*** is used in power transmission. Due to modification of the existing transmission system, it is required to replace the solid shaft by a hollow shaft of the same material and equally strong in torsion. Further, the weight of the hollow shaft per meter length should be half of the solid shaft. Determine the outer diameter of the hollow shaft in terms of ***d***.

OR

A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the permissible shear stress is 84 N/mm^2. Calculate the inside and outside diameters of the shafts.

3 a) What is Nip of leaf spring?

b) What is Surge in Spring?

c) What are the disadvantages of power screws?

d) A double-threaded power screw, with ISO metric trapezoidal threads is used to raise a load of 300 kN. The nominal diameter is 100mm. and the pitch is 1.2mm. The coefficient of friction at the screw threads is 0.15. Neglecting collar friction, calculate :

i) Torque required to raise the load,

ii) Torque required to lower the load and

iii) Efficiency of the screw.

OR

A helical compression spring of a cam mechanism is subjected to an initial preload of 50 N. The maximum operating force during the load cycle is 150 N. The wire diameter is 3 mm, while the mean coil diameter is 18mm. The spring is made of oil-hardened and tempered valve spring wire of Grade - VW (S_{ut} = 1430 N/mm^2). Determine the factor of safety used in the design on the basis of fluctuating stresses.

4 a) What is Self-Locking block brake?

b) What is the difference Clutch and brake?

c) Name the friction materials used in clutches and brakes.

d) A plate clutch consists of one pair of contacting surfaces. The inner and outer diameters of the friction disks are 100 and 200mm respectively. The coefficient of friction is 0.2 and the permissible intensity of pressure is 1 N/mm^2, assuming uniform wear theory, calculate the power-transmitting capacity of the clutch at 750 rpm.

OR

What is the condition of self-locking in differential band brake? Why should it be avoided in speed-control brakes? What is back-stop band brake?