

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Motion Control

Subject Code : 4TE08MCN1

Branch: B.Tech (IC)

Semester : 8

Date : 26/04/2018

Time : 02:30 To 05:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

- Q-1 Attempt the following questions: (14)**
- a) Which of the following can be a final control element in a control system**
- | | | |
|--------------------|-----------------------|----|
| a) Servomotor only | b) Stepper motor only | 01 |
| c) Control valve | d) Any of the above | |
- b) Which of the following factors are to be considered for the selection of power amplifier?**
- | | | |
|----------------------------|------------------------|----|
| a) Output device selection | b) Output stage design | 01 |
| c) Gainbandwith | d) All of the above | |
- c) The maximum power that a transistor can safely dissipate is given by _____.**
- | | | | | |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----|
| a) $P_{max}=V_{cc} \times I_c$ | b) $P_{max}=V_{ce} \times I_c$ | c) $P_{max}=V_{ce} \times I_e$ | d) $P_{max}=V_{cc} \times I_e$ | 01 |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----|
- d) Which of the following Lorentz force equation is correct?**
- | | | | | |
|------------|-----------|-----------|------------|----|
| a) $F=IBL$ | b) $F=MA$ | c) $F=Wd$ | d) $F=BAL$ | 01 |
|------------|-----------|-----------|------------|----|
- e) Which of the following can be consider to be selection criteria for incremental motion control application.?**
- | | | |
|------------------------|------------------------|----|
| a) Motor efficiency | b) Armature resistance | 01 |
| c) Armature inductance | d) All of the above | |
- f) Cross-Over distortion occurs in power amplifier under following condition.**
- | | | |
|--------------------------|-------------------------|----|
| a) if $V_{in} < V_{be}$ | b) if $V_{be} < V_{in}$ | 01 |
| c) Both a) & b) are true | d) None of the above | |
- g) Which of the following is not a mechanical matching device?**
- | | | | | |
|---------------|-------------------------|----------|-----------|----|
| a) Gear train | b) Timing Conveyor belt | c) Lever | d) Spring | 01 |
|---------------|-------------------------|----------|-----------|----|
- h) Write the principle of working of hybrid stepper motor.** 01
- i) Define step angle.** 01
- j) When do we need an amplifier to drive dc motor?** 01



- k) What is the difference between linear power amplifier and PWM amplifier? 01
- l) What is the difference between incremental and absolute encoder? 01
- m) Give the difference between servomotor and stepper motor. 01
- n) Enlist different types of dc motor. 01

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
- a) Explain in brief the analysis of the incremental motion control system with inertia as a mechanical load. 05
 - b) Enlist all the selection criteria for stepper motor? Explain them briefly. 05
 - c) Explain cross over distortion in power amplifiers. 04
- Q-3 Attempt all questions (14)**
- a) Explain dc motor position control system with potentiometer as an error sensor with suitable diagram. 07
 - b) Explain different operating modes of a DC motor. 07
- Q-4 Attempt all questions (14)**
- a) Explain in detail the block diagram of Phase Lock Servo system (PLS). Give the difference between PLL & PLS. 07
 - b) Describe the selection criterion for incremental motion applications. 07
- Q-5 Attempt all questions (14)**
- a) Explain briefly the techniques for minimizing torsional resonance effect. 07
 - b) Explain briefly PWM amplifier with suitable diagram. 07
- Q-6 Attempt all questions (14)**
- a) List out the performance characteristics of stepper motor and explain them. 07
 - b) With suitable waveform and circuit diagram explain Unidirectional three phase logic sequencer for stepper motor. 07



- Q-7 Attempt all questions (14)**
- a) Explain in detail different types of stepping in a stepper motor with suitable diagram. 07
 - b) Write a note on bidirectional servo amplifiers. 07
- Q-8 Attempt all questions (14)**
- a) Enlist different types of Stepper Motors. Explain any one with suitable diagram. 07
 - b) Write a technical note on Optical encoder. 07

