

**B.TECH. SEM -VII MECHANICAL 2014 COURSE (CBCS) :  
SUMMER - 2018  
SUBJECT: AUTOMATIC CONTROL SYSTEM**

Day: **Tuesday**  
Date: **22/05/2018**

**S-2018-2515**

Time: **02.30 PM TO 05.30 PM**  
Max Marks: 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.
- 4) Use of non-programmable **CALCULATOR** is allowed.

**Q.1** Using Routh-Hurwitz's Criteria, Find Stability of the system whose [10]  
characteristic equation is given by,

$$F(S) = S^6 + 3S^5 + 4S^4 + 6S^3 + 5S^2 + 3S + 2$$

**OR**

**Q.1** Derive the system differential equation and obtain transfer function for the [10]  
system shown in figure.

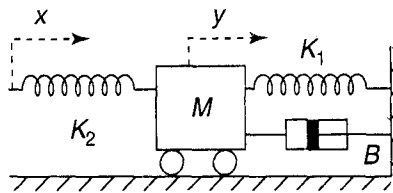


Figure 1

**Q.2** Reduce the system described by figure 2 to a single block and determine the [10]  
transfer function of that block.

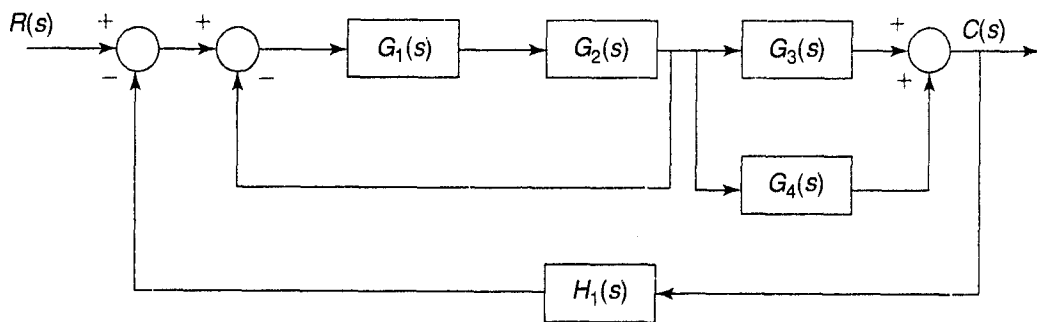


Figure 2

**OR**

**Q.2** Find the single block equivalent by block diagram reduction technique for the [10]  
following control system shown in figure 3

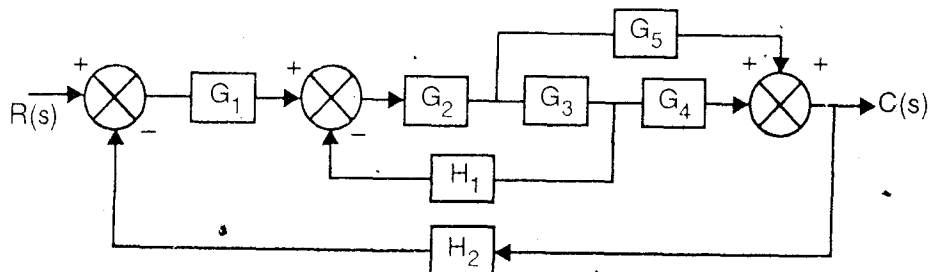


Figure 3

**P.T.O.**

- Q.3** Define the following terms. **[10]**
- i) Concept of state
  - ii) State Variables
  - iii) State vector
  - iv) State space

**OR**

- Q.3** Write notes on transient response specification. **[10]**

- Q.4** Draw the circuit diagram of a successive approximation (SAR) type ADC and explain how it works. **[10]**

**OR**

- Q.4** Derive the gain equation for an inverting and non-inverting amplifier. **[10]**

- Q.5** Describe and compare the characteristics of, **[10]**
- a) Proportional plus integral control
  - b) Proportional plus integral plus derivative control

**OR**

- Q.5** Describe the role of various engineering disciplines in mechatronics. Draw the block diagram for a mechatronics system & explain in detail function of each sub-system. **[10]**

- Q.6** Write a short note on following: **[10]**
- a) Count-Up & Count-Down Counter
  - b) Ladder diagram that depicts the operation of NAND gate

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