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**Question Paper Code: 59713**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fifth Semester

Biomedical Engineering

15UBM503 – BIO CONTROL SYSTEM

(Regulation 2015)

Duration: One hour

Maximum: 30Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

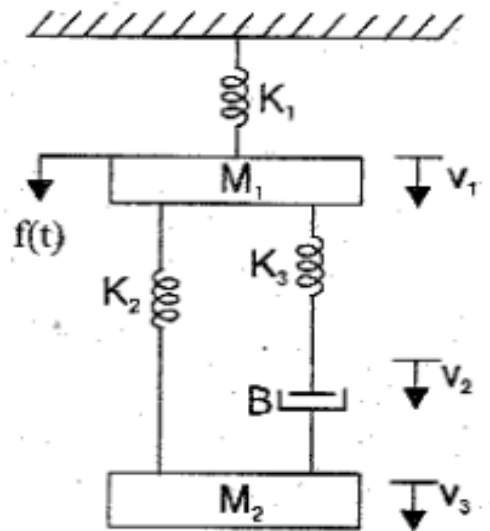
- In closed loop control system, with positive value of feedback gain the overall gain of the system will CO1- R  
(a) Decrease      (b) Increase      (c) Be unaffected      (d) All of the above
- A car is running at a constant speed of 50 km/h, which of the following is the feedback element for the driver? CO1- R  
(a) Clutch      (b) Eyes  
(c) Needle of the speedometer      (d) Steering wheel
- Which among the following is represented by a parabolic input signal? CO2-R  
(a) Position      (b) Force      (c) Velocity      (d) Acceleration
- Type and order of transfer function  $G(s) = K / \{s(s+2)\}$  CO2- R  
(a) 1, 2.      (b) 2, 1.      (c) 0, 2.      (d) 2, 2.
- At which frequency does the magnitude of the system becomes zero dB? CO3- U  
(a) Resonant frequency      (b) Cut-off frequency  
(c) Gain crossover frequency      (d) Phase crossover frequency
- What is the effect of gain margin when the system gain is doubled? CO3- R  
(a) 2 times      (b) 1/2 times  
(c) Remains unaffected      (d) None of the above
- The number of roots of  $s^3 + 5s^2 + 7s + 3 = 0$  in the left half of the s – plane is CO4- U  
(a) 0      (b) 1      (c) 2      (d) 2

8. The magnitude condition for root locus is CO4- R
- (a)  $|G(s)H(s)| = 0$  (b)  $|G(s)H(s)| = 2$   
 (c)  $|G(s)H(s)| = 1$  (d)  $|G(s)H(s)| = \infty$
9. In general, the controller of physiological system is \_\_\_\_\_. CO5- U
- (a) Adaptive (b) Feedback  
 (c) Feed forward (d) None of the above
10. \_\_\_\_\_ Feedback is highly common in physiological systems. CO5- U
- (a) Embedded (b) Segregated (c) Positive (d) None of the above

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. For the mechanical system shown in Fig., draw the force-current CO1- App (8)  
 electrical analogous circuits. Also verify the equations.



12. The response of a servo mechanism is  $c(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$  CO2- App (8)  
 when subject to a unit step input. Obtain an expression for closed loop transfer function. Determine the un-damped natural frequency and damping ratio.
13. Sketch the Polar plot and determine the gain margin and phase margin CO3- App (8)  
 for a unity feedback system is given by,  $G(s) = \frac{1}{s(1 + 0.5s)(1 + 4s)}$ .

14. Sketch the root locus for a closed loop system whose open loop transfer function is given by  $G(S) H(S) = \frac{K}{s(s+2)(s+4)}$ . CO4- App (8)
15. Differentiate physiological control system with an engineering control system. CO5- Ana (8)