

**GANPAT UNIVERSITY**  
**B. TECH SEM.V-MECHATRONICS ENGINEERING**  
**REGULAR EXAMINATION-NOV/DEC-2016**  
**2MC502: CONTROL ENGINEERING**

Time: 3 Hours

Total Marks : 60

**Instructions:** (1) This Question paper has two sections. Attempt each section in separate answer book.  
 (2) Figures on right indicate marks.  
 (3) Be precise and to the point in answering the descriptive questions.

## SECTION: I

Q.1 Attempt all.

(10)

- (a) Determine stability of the system using Hurwitz criterion.

(05)

$$D(s) = 3s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15$$

- (b) A position control has system transfer function

(05)

$$G(s) = \frac{1}{0.2s + 1}$$

The input changes with constant rate of  $5^\circ$  per second from zero position. Calculate the error after 0.4 second and the steady state error.

OR

Q.1 Attempt all.

(10)

- (a) A electric drive has an open loop transfer function

(05)

$$G(s)H(s) = \frac{40(s+2)}{s(s^2 + 8s + 9)}$$

Draw bode plot and Determine

- |                 |                              |
|-----------------|------------------------------|
| a. Gain margin  | b. Gain crossover frequency  |
| c. Phase margin | d. Phase crossover frequency |
- (b) Determine the values of K and k such that the system has a damping ratio  $\xi$  of 0.7 and an undamped natural frequency  $\omega_n$  of 4 rad/sec for following system. (05)

