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| Discipline  **Electrical Engg.** | Semester:-  **6th** | Name of the Teaching Faculty:-  **New-2** |
| Subject:-  **CONTROL SYSTEM ENGINEERING** | No of Days/per Week Class Allotted :-  **4** | Semester From:- **2nd Jan, 2019** To:- **15th Apr, 2019**  No of Weeks:- **15** |
| **Week** | **Class Day** | **Theory/ Practical Topics** |
| 1st | 1st | SIGNAL FLOW GRAPH.  1.1.1 Review of block diagrams and transfer functions of multivariable systems. |
| 2nd | 1.1.2 Review of block diagrams and transfer functions of multivariable systems. |
| 3rd | 1.2.1 Construction of signal flow graph. |
| 4th | 1.2.2 Construction of signal flow graph. |
| 2nd | 1st | 1.3.1 Basic properties of signal flow graph. |
| 2nd | 1.3.2 Basic properties of signal flow graph. |
| 3rd | 1.4.1 Signal flow graph algebra |
| 4th | 1.4.2 Signal flow graph algebra |
| 3rd | 1st | 1.5.1 Construction of signal flow graph for control system. |
| 2nd | 1.5.2 Construction of signal flow graph for control system. |
| 3rd | TIME RESPONSE ANALYSIS.  2 . 1 Time response of control system. |
| 4th | 2 . 2 Standard Test signal.  2.2.1. Step signal,  2.2.2. Ramp Signal  2.2.3. Parabolic Signal  2.2.4. Impulse Signal |
| 4th | 1st | 2 . 3 Time Response of first order system with:  2.3.1. Unit step response |
| 2nd | 2.3.2. Unit impulse response. |
| 3rd | 2 . 4 Time response of second order system to the unit step input.  2.4.1. Time response specification. |
| 4th | 2.4.2. Derivation of expression for rise time, peak time, peak  overshoot, settling time and steady state error. |
| 5th | 1st | 2.4.2. Derivation of expression for rise time, peak time, peak  overshoot, settling time and steady state error. |
| 2nd | 2.4.3. Steady state error and error constants. |
| 3rd | 2 . 5 Types of control system.[ Steady state errors in Type-0, Type-1, Type-2  system] |
| 4th | 2 . 6 Effect of adding poles and zero to transfer function. |
| 6th | 1st | 2 . 7.1 Response with P, PI, PD and PID controller. |
| 2nd | 2 . 7.2 Response with P, PI, PD and PID controller. |
| 3rd | ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE.  3 . 1 Root locus concept. |
| 4th | 3 . 1 Root locus concept. |
| 7th | 1st | 3 . 2 Construction of root loci. |
| 2nd | 3 . 2 Construction of root loci. |
| 3rd | 3 . 2 Construction of root loci. |
| 4th | 3 . 3 Rules for construction of the root locus. |
| 8th | 1st | 3 . 3 Rules for construction of the root locus. |
| 2nd | 3 . 3 Rules for construction of the root locus. |
| 3rd | 3 . 3 Rules for construction of the root locus. |
| 4th | 3 . 4 Effect of adding poles and zeros to G(s) and H(s). |
| 9th | 1st | 3 . 4 Effect of adding poles and zeros to G(s) and H(s). |
| 2nd | 3 . 4 Effect of adding poles and zeros to G(s) and H(s). |
| 3rd | FREQUENCY RESPONSE ANALYSIS.  4 . 1 Correlation between time response and frequency response |
| 4th | 4 . 2 Polar plots. |
| 10th | 1st | 4 . 2 Polar plots. |
| 2nd | 4 . 2 Polar plots. |
| 3rd | 4 . 3 Bode plots. |
| 4th | 4 . 3 Bode plots. |
| 11th | 1st | 4 . 3 Bode plots. |
| 2nd | 4 . 4 All pass and minimum phase system. |
| 3rd | 4 . 5 Computation of Gain margin and phase margin. |
| 4th | 4 . 5 Computation of Gain margin and phase margin. |
| 12th | 1st | 4 . 6 Log magnitude versus phase plot. |
| 2nd | 4 . 6 Log magnitude versus phase plot. |
| 3rd | 4 . 7 Closed loop frequency response. |
| 4th | 4 . 7 Closed loop frequency response. |
| 13th | 1st | NYQUIST PLOT  5.1 Principle of argument. |
| 2nd | 5.2 Nyquist stability criterion. |
| 3rd | 5.2 Nyquist stability criterion. |
| 4th | 5.2 Nyquist stability criterion. |
| 14th | 1st | 5.3 Niquist stability criterion applied to inverse polar plot. |
| 2nd | 5.3 Niquist stability criterion applied to inverse polar plot. |
| 3rd | 5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist  plot. |
| 4th | 5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist  plot. |
| 15th | 1st | 5.5 Assessment of relative stability. |
| 2nd | 5.6 Constant M and N circle |
| 3rd | 5.6 Constant M and N circle |
| 4th | 5.7 Nicholas chart. |