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DELHI ADMINISTRATION, UNDER SOCIETIES REGISTRATION ACT XXI OF 1860

Question Paper For Internal Assessment Examination (Theory) - Credit 4 / 51 /

Instructions for Students/FacultyMid Term I (Total 80 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are ten (5 from CO1 and 5 from CO2), each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (Not More Than 25 Words For both Question & Answer), no objective type or fill in the blanks. Total 20 marks.
- Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are long answer type (Not More Than 50 Words for Question), each carrying 5 marks. Total 20 marks.
- Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are numerical answer type / fully elaborative type (Not More Than 70 Words for Question) *, each carrying 10 marks. Total 40 marks.

Mid Term II (Total 120 Marks, 2.5 HRS., Syllabus from Unit-2)

- Part A: Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 4 marks and are compulsory to attend. There is no choice. They are short answer type questions (Not More Than 25 Words For both Question & Answer), no objective type or fill in the blanks. Total 40 marks.
- Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are long answer type (**Not More Than 50 Words for Question**), each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are numerical answer type / fully elaborative type (Not More Than 70 Words For Question) *, each carrying 13 marks. Total 52 marks.

Mid Term III (Total 120 Marks, 2.5 HRS., Syllabus from Unit-3)

- Part A: Total number of questions to be given are ten (5 from CO5 and 5 from CO6), each carrying 4 marks and are compulsory to attend. There is no choice. They are short answer type questions (Not More Than 25 Words For both Question & Answer), no objective type or fill in the blanks. Total 40 marks.
- Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are long answer type (Not More Than 50 Words for Question), each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are numerical answer type / fully elaborative type (Not More Than 70 Words for Question) *, each carrying 13 marks. Total 52 marks.

* LIST OF ELABORATIVE THEORY QUESTION SUBJECTS: NO SUBJECT UNDER CREDIT FOUR

Instructions For Faculties:

There should be total 6 Course Outcomes (COs) for each subject.

- Mid Term Question Papers are to be submitted as per Course Outcomes (COs) which should be divided equally in Part A, Part B and Part C according to Mid Term Examination and Credit Point.
- In Mid Term-1, the questions are to be given from CO1 and CO2. In Mid Term-2, the questions are to be given from CO3 and CO4. Similarly, in Mid Term-3, the questions are to be given from CO5 and CO6.







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INSTRUCTION FOR STUDENTS

 STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM, AND MAY LEAVE THE EXAM HALL ON EXPIRY OF ATLEAST OF 1 Hr FROM THE STARTING TIME OF **EXAMINATION.**

QUESTION PAPER AND STUDENTS DETAILS

Type of Exam	Mid Term 3	Date of Submission	19/08/2021
Name of Faculty	Ms. Tarun Thukral	Date of Examination	25/08/2021
Course	B.Tech (Mechatronics Engineering)	Semester	SEMESTER:4
Batch	Fifth (5)	Subject	4 MH4 - 07 Control System (Cr 4)

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPER (Faculties are required to mention relevant Course Outcome number against the respective question in QP)

Course Outcome	 Student will learn about the basic concepts of control system, its mathematical modelling and reduction techniques. Student will learn about the time response of first and second order system, its steady state analysis and PID controllers. Student will learn about the frequency domain analysis of different control systems. Student will learn about the different criterion of stability mechanisms of control systems. Student will learn about the compensation techniques of lead, lag and lead-lag network. Student will learn about the different control system design problems with the help of matlab. 		
Email I'd	tarunthukral@soaneemrana.org	Phone No.	750-096-6580
Student Name		Student Reg No.	

Part A

All the questions are compulsory to attend.

1. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

Question : 1	Define compensation.		
34	COMPENSATION DESIGN	Automatic Control System by S Hasan Saeed	
Question : 2	Define phase lag compensation.		
34	COMPENSATION DESIGN	Automatic Control System by S Hasan Saeed	



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Question:3 Define phase lead compensation. Automatic Control 35 COMPENSATION DESIGN System by S Hasan Saeed **Question:4** Write the need of compensator. Automatic Control 34 COMPENSATION DESIGN System by S Hasan Saeed **Question:5** Define phase lag-lead compensation. Control Automatic 36 System by S Hasan COMPENSATION DESIGN Saeed 2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF 6 MIDTERM, AS PER INSTRUCTIONS ABOVE. **Question:6** Define Matlab. Automatic Control 37 System by S Hasan MATLAB applications Saeed **Question:7** Define script. Control Automatic 37 **MATLAB** applications System by S Hasan Saeed Question:8 Define variable, arguments and returns. Automatic Control 37 MATLAB applications System by S Hasan Saeed **Question:9** Explain the representation of numbers in MATLAB. Control Automatic 38 MATLAB applications System by S Hasan Saeed Question: 10 Write the applications of MATLAB. Automatic Control 40 MATLAB applications System by S Hasan Saeed Part B







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FOR MIDTERM 1 - Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).

FOR MIDTERM 2 - Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).

FOR MIDTERM 3 - Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

3. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

Question:1 Design phase lag compensation. Automatic Control 34 COMPENSATION DESIGN System by S Hasan Saeed Question:2 Design phase lead compensation. Automatic Control 35 System by S Hasan COMPENSATION DESIGN Saeed Question: 3 Design lead-lag compensator using Bode plot. Automatic Control 36 COMPENSATION DESIGN System by S Hasan Saeed 4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF 6 MIDTERM, AS PER INSTRUCTIONS ABOVE. Question: 4 Find the roots using Matlab $H(s) = (s^2 - 2^3 + 1)/(s^3 + 3s^2 + 4s + 2)$ Control Automatic 37 MATLAB applications System by S Hasan Saeed The closed loop transfer function of a system is s² + 9s +19/s³ +7s² + 14s +8.Determine Question: 5 the unit step response of the system using MATLAB. Automatic Control 38 MATLAB applications System by S Hasan Saeed **Question:6** Sketch the Nyquist plot of G(s) = 90 / (s+3)(s+6) using MATLAB. Control Automatic 39 MATLAB applications System by S Hasan Saeed Question : 7 (Old Pattern) Part C



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FOR MIDTERM 1 - Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).

FOR MIDTERM 2 - Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).

FOR MIDTERM 3 - Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.

Question : 1	Design a lead compensator for a system whose open loop transfer function is $G(s) = 4 / s(s+2)$ to meet the following specifications damping ratio 0.5 and natural frequency is 4 radian per sec.		
36	COMPENSATION DESIGN	Automatic Control System by S Hasan Saeed	
Question : 2	Design a suitable lag compensating network for $G(s) = K / s(s+2)(s+20)$ to meet the following specifications i.e velocity error coefficient is 20 per sec nd phase margin is greater than or equal to 35 degrees.		
34	COMPENSATION DESIGN	Automatic Control System by S Hasan Saeed	
Question : 3	The open loop transfer function of a unity feedback is $G(s) = K / s(1+0.2s)$. It is required velocity error constant should be at least 20 and phase margin should be 45 degrees. Does the system meet the required specifications. If not, design the compensating network to satisfy the required specifications.		
35	COMPENSATION DESIGN	Automatic Control System by S Hasan Saeed	
3. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			
MIDTERM, AS PER INST	RUCTIONS ABOVE.		6
MIDTERM, AS PER INST Question : 4	FRUCTIONS ABOVE. Sketch the root locus for $G(s) = K(s+$	1) / s^2(s+3.6) using MATL	6 AB.
Output Output <th>FRUCTIONS ABOVE. Sketch the root locus for $G(s) = K(s+)$ MATLAB applications</th> <th>1) / s^2(s+3.6) using MATL Automatic Control System by S Hasan Saeed</th> <th>6 AB.</th>	FRUCTIONS ABOVE. Sketch the root locus for $G(s) = K(s+)$ MATLAB applications	1) / s^2(s+3.6) using MATL Automatic Control System by S Hasan Saeed	6 AB.
Output Output <th>FRUCTIONS ABOVE. Sketch the root locus for G(s) = K(s+ MATLAB applications Sketch the bode plot for the transfer to the</th> <th>1) / $s^2(s+3.6)$ using MATL Automatic Control System by S Hasan Saeed function G(s) = 1000 / (1+0</th> <th>6 .AB. 0.1s)(1+0.001s)</th>	FRUCTIONS ABOVE. Sketch the root locus for G(s) = K(s+ MATLAB applications Sketch the bode plot for the transfer to the	1) / $s^2(s+3.6)$ using MATL Automatic Control System by S Hasan Saeed function G(s) = 1000 / (1+0	6 .AB. 0.1s)(1+0.001s)
Output Output <th>FRUCTIONS ABOVE. Sketch the root locus for G(s) = K(s+ MATLAB applications Sketch the bode plot for the transfer MATLAB applications</th> <th>1) / $s^2(s+3.6)$ using MATL Automatic Control System by S Hasan Saeed function G(s) = 1000 / (1+0 Automatic Control System by S Hasan Saeed</th> <th>6 .AB. 0.1s)(1+0.001s)</th>	FRUCTIONS ABOVE. Sketch the root locus for G(s) = K(s+ MATLAB applications Sketch the bode plot for the transfer MATLAB applications	1) / $s^2(s+3.6)$ using MATL Automatic Control System by S Hasan Saeed function G(s) = 1000 / (1+0 Automatic Control System by S Hasan Saeed	6 .AB. 0.1s)(1+0.001s)
Question : 4 Question : 5 Question : 6	Recomplete (GO) Notability AccordingFRUCTIONS ABOVE.Sketch the root locus for $G(s) = K(s+$ MATLAB applicationsMATLAB applicationsDesign a lag compensator for is $G(s) = K / s(s+1)(s+4)$ to m0.5, settling time 10 sec and w5.	1) / s^2(s+3.6) using MATL Automatic Control System by S Hasan Saeed function G(s) = 1000 / (1+0 Automatic Control System by S Hasan Saeed r a system whose op eet the following spe velocity error constant	AB. 0.1s)(1+0.001s) een loop transfer function cifications damping ratio t is greater than equal to

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40	MATLAB applications	Automatic Control System by S Hasan Saeed	
Jpload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions. (Mention question number with relevant fig / numerical / equations. Max 150 KB)			
have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.			
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