School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Approved by Director General of Civil Aviation, Govt. of India, All India Council for Technical Education
Ministry of HRD, Govt of India & Affiliated to Rajasthan Technical University, Kota & BTU, Bikaner Rajasthan

Question Paper For Internal Assessment Examination (Theory) - Credit 3 / 58 / SET 1

Instructions For Students / FacultyMid Term I (Total 60 Marks, 2 HRS. Syllabus From Beginning Of Session)

• Part A: Total number of questions to be given are five, each carrying 3 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 15 marks.

• Part B: Total number of questions to be given are six, out of which student has to answer any four. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 6 marks. Total 24 marks.

• Part C: Total number of questions to be given are four, out of which student has to answer any three. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 7 marks. Total 21 marks.

Mid Term II & III (Total 90 Marks, 2.5 HRS. Syllabus From Beginning Of Session)

• Part A: Total number of questions to be given are ten, 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 seven, out of which student has to answer any five. They are long answer type (**Not More Than 50 Words For Question)**, each carrying 6 marks. Total 30 marks.

• Part C: Total number of questions to be given are five, out of which student has to answer any four. They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)***, each carrying 10 marks. Total 40 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: 3 MH4 - 07 Manufacturing Process, 4 AN4 - 06 Aircraft Materials and Processes (Cr 3), 5 AN4 - 05 Aircraft System (Cr 3), 6 AN4 - 05 Avionics-I (Cr 3), 6 MH4 - 03 Applied Hydraulics & Pneumatics (Cr 3), 6 MH5 - 11 Principles of Management (Cr 3), 6 MH5 - 13 Aircraft Electronics System (Cr 3), 7 AN5 - 12 Maintenance of Airframe and System (Cr 3), 7 AN5 - 13 Helicopter Theory (Cr 3), 7 AG6 - 60.1 Human Engineering and Safety (Cr 3), 7 ST - 01 Avionics II (Special Theory Subject) (Cr 3), 7 MH5 - 11 Design of Mechatronics Systems (Cr 3), 7 MH5 - 12 Robotics and Machine Vision System (Cr 3), 7 MH6 - 13 Medical Electronics (Cr 3), 7 AN6 - 60.1 Aircraft Avionic System (Cr 3), 8 AN5 - 12 Maintenance of Power Plant and System (Cr 3), 8 AN5 - 13 Unmanned Aerial Vehicles & Systems (UAV) (Cr 3), 8 MH5 - 13 Product Development & Launching (Cr 3), 8 EC6 - 60.2 Robotics and control (Cr 3)

FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER

Question Paper & Student Details

Mid Term	Mid Term 3	**Date of Submission**	26/09/2020
Name of Faculty	Mr. Deepak Tomar	**Date of Examination**	01/10/2020
Course	B.Tech (Mechatronics Engineering)	**Semester**	SEMESTER : 5
Batch	Fourth (4)	**Subject**	5 MH4 - 05 Modern Control Engineering (Cr 3)

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	COURSE OUTCOME 1.Able to understand the concepts of base,domain,range,time variance & causality and apply it in the designing of modern control system. 2. Able to apply the core concepts of state,state variables,& space modelling of electrical & mechanical system in making & solving real life applications. 3. Able to analyze different block diagram representation of state model,signal flow graph & diagonal matrix & apply it in the designing of associated parameters. 4. The student will be able to develop an understanding of how to design for typical control applications using the concepts of eigen values,eigen vectors & state transition matrix. 5. Capable to analyze controllability & observability,difference equation, signal reconstruction & pole placement techniques in the design process of the control system. 6. Capable to apply the real life application of Z transform,block diagram analysis of sampled data system,sample & hold circuit & making a suitable model based on it, 7. Capable to frame a stable control system by applying the concepts of Routh-Hurwitz & Jury stability criteria along with the basic concepts of digital PID controller & adaptive control.

Email I'd	Deepaktomar@soaneemrana.org	**Phone No.**	965-454-4096
Student Name		**Student Reg No.**	

Part A

Question : 1	Explain state space.		
12	State space	Modern Control System Theory By M. Gopal	2
Question : 2	What is causality?		
8	Causality	Modern Control System Theory By M. Gopal	1
Question : 3	What is the phase variable?		
16	Phase variable	Modern Control System Theory By M. Gopal	2
Question : 4	Discuss steps to draw the state model.		
18	State model	Modern Control System Theory By M. Gopal	3
Question : 5	Explain discrete-time representation?		
17	Discrete-time representation	Modern Control System Theory By M. Gopal	3
Question : 6	Define Eigenvectors.		
23	Eigenvectors	Modern Control System Theory By M. Gopal	5
Question : 7	What is the physical variable?		
16	Physical variable	Modern Control System Theory By M. Gopal	3
Question : 8	What is meant by diagonalization?		
2	Diagonalization	Modern Control System Theory By M. Gopal	4
Question : 9	Define z Transform.		
32	Z Transform	Modern Control System Theory By M. Gopal	6
Question : 10	What is a bilinear transformation?		
37	Bilinear transformation	Modern Control System Theory By M. Gopal	7
Part B			
Question : 1	Find the state-space representation of the following transfer function system in the diagonal canonical form. G(s) = 2s + 3s/2 + 5s + 6		
20	State-space	Modern Control System Theory By M. Gopal	2
Question : 2	The state model of a linear time invariant system is given by X(t) = AX(t) + BU(t) Y(t) =CX(t) + DU(t) . Write the expression for transfer function of the system		
20	State model	Modern Control System Theory By M. Gopal	4
Question : 3	Explain the properties of the signal flow graph		
19	Signal flow graph	Modern Control System Theory By M. Gopal	4
Question : 4	Explain domain and range.		
4	Domain and range	Modern Control System Theory By M. Gopal	1
Question : 5	Explain the state transition matrix.		
23	State transition matrix	Modern Control System Theory By M. Gopal	4
Question : 6	Explain the block diagram analysis of sampled data systems.		
33	Sampled data systems	Modern Control System Theory By M. Gopal	6
Question : 7	Write the difference between modern & conventional control theory.		

9	Modern & conventional control theory	Modern Control System Theory By M. Gopal	1
Part C			
Question : 1	Discuss the concept of Linearity with example.		
5	Linearity	Modern Control System Theory By M. Gopal	1
Question : 2	Describe Jordan canonical form in detail.		
21	Jordan canonical form	Modern Control System Theory By M. Gopal	4
Question : 3	Describe time invariance with example		
7	Time invariance	Modern Control System Theory By M. Gopal	1
Question : 4	Suppose that the characteristic polynomial of a matrix A is (λ − 1)3(λ − 2)2. Determine all the possible Jordan normal forms of A up to conjugation.		
21	Jordan normal form	Modern Control System Theory By M. Gopal	4
Question : 5	Give an example of the electrical system and explain the state space approach.		
15	State space approach	Modern Control System Theory By M. Gopal	2
Upload 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)*			
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.			

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