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 / 50 /

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**	24/09/2020
Name of Faculty	Ms. Tarun Thukral	**Date of Examination**	30/09/2020
Course	B.Tech (Mechatronics Engineering)	**Semester**	SEMESTER : 5
Batch	Fourth (4)	**Subject**	5 MH4 - 03 Sensors (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	1. Able to demonstrate an understanding of the fundamentals of Sensors 2. Proficient to understand different types of Sensors, Strain gauge, resolution, accuracy, sensitivity 3. Capable to understand applications of Sensors 4. Gain an understanding of working and construction of LVDT and Magnetostrictive type sensor 5. Competent to understand Capacitive sensors, piezoelectric effect, ultrasonic sensors. 6. Students will be able to describe the concept of Thermal sensors, Material used, RTD, Thermister, Thermoemf sensor 7. Capable to explain Magnetic sensors, Wiedemann effect, Villari effect, Hall effect, LDR, photodiodes. 8. Students will be able to grab a basic understanding of Smart Sensors-film sensor, Radiation Sensors, and their applications make 9. Students will be able to differentiate between WSN & Adhoc Networks 10. Able to understand Wireless Sensor Networks (WSNs) and apply its various applications.
Email I'd	tarunthukral@soaneemrana.org
Phone No.	750-096-6580
Student Name	
Student Reg No.	

Part A		
Question : 1	What are Adhoc networks?	
37	Wireless Sensor Networks	Wireless Sensor Networks Wiley Publications By Ian F. Akyildiz ‖ 9

Question : 2		What do you mean by MEMS sensors?	
35	Wireless Sensor Networks	Wireless Sensor Networks Wiley Publications By Ian F. Akyildiz	9
Question : 3		Define smart sensors.	
32	Smart Sensors	Smart Sensor Systems Emerging Technologies and Applications Wiley Publications	8
Question : 4		Explain Hall effect.	
25	Magnetic sensors	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	7
Question : 5		What do you mean by pyroelectric type sensor?	
22	Thermoemf sensor	Handbook of Modern Sensors: Physics, Designs, and Applications, Fourth Edition By Jacob Fraden	6
Question : 6		Explain villari effect.	
23	Magnetic sensors	Handbook of Modern Sensors: Physics, Designs, and Applications, Fourth Edition By Jacob Fraden	7
Question : 7		Explain the principle of LVDT.	
8	LVDT	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	4
Question : 8		Explain the principle of capacitive sensor.	
9	Capacitive sensors	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	5
Question : 9	Explain the following terms: i. Resolution ii. Sensitivity		
3	Principle of sensing & transduction	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	2
Question : 10		Write the difference between sensor and transducer.	
2	Principle of sensing & transduction	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	1
Part B			
Question : 1		Explain the characteristic requirements and challenges in designing of WSN.	
34	Wireless Sensor Networks	Wireless Sensor Networks Wiley Publications By Ian F. Akyildiz	9
Question : 2		Explain the applications of smart sensor in environmental monitoring in detail.	
33	Smart Sensors	Smart Sensor Systems Emerging Technologies and Applications Wiley Publications	8
Question : 3		Explain the operating principle of the artificial retina in WSN.	
40	Wireless Sensor Networks	Wireless Sensor Networks Wiley Publications By Ian F. Akyildiz	9
Question : 4		Explain scintillation detectors.	
38	Magnetic sensors	Handbook of Modern Sensors: Physics, Designs, and Applications, Fourth Edition By Jacob Fraden	7
Question : 5		Exlain RTD in detail.	
18	Thermal sensors	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	6
Question : 6		Explain the working of piezoelectric sensors.	

12	Capacitive sensors	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	5
Question : 7	Explain the working of ultrasonic sensors.		
16	Capacitive sensors	Handbook of Modern Sensors: Physics, Designs, and Applications, Fourth Edition By Jacob Fraden	5
Part C			
Question : 1	Derive the voltage and charge coefficient of piezoelectric sensors.		
13	Capacitive sensors	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	5
Question : 2	A thermistor has a resistance of 3980 ohm at the ice point and 794 at 50 degree celsius. Calculate constants a and b of temperature resistance relationship.		
19	Thermal sensors	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	6
Question : 3	A capacitive transducers uses two quartz diaphragms of area 750 mm2 separated by a distance of 3.5 mm. A pressure of 900 kN/m2 when applied to the top diaphragm produces a deflection of 0.6 mm. The capacitance is 370 pF when no pressure is applied to the diaphragms. Find the value of capacitance after the application of a pressure of 900 kN/m2.		
12	Capacitive transducers	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	5
Question : 4	A single strain gauge having resistance of 120 ohm is mounted on a steel cantilever beam at a distance of 0.15 meter from the free end. The change in gauge resistance is found to be 0.152 ohm. The beam is 0.25m long with a width of 20mm and a depth of 3mm.The Young's modulus for steel is 200 GN/m2. Calculate the gauge factor.		
4	Strain Gauge	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	2
Question : 5	A LVDT under a certain input voltage has a specifications which includes the following information: Range = +- 30 mm Accuracy = 0.5 % Sensitivity = 5mV/mm When its output is 0.05 V, calculate the possible values of displacement of its rod.		
8	LVDT	A course in Electrical & Electronic Measurements and Instrumentation By A. K Sawhney	4
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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