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 2 / 28

Instructions For Students / FacultyMid Term I (Total 40 Marks, 1.5 HRS. Syllabus From Beginning Of Session)
• Part A: Total number of questions to be given are four, 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 8 marks.
• Part B: Total number of questions to be given are five, out of which student has to answer any three. They are long answer type **(Not More Than 50 Words For Question Only)**, each carrying 6 marks. Total 18 marks.
• Part C: Total number of questions to be given are three, out of which student has to answer any two. They are numerical answer type / fully elaborative type* **(Not More Than 70 Words For Question Only)**, each carrying 7 marks. Total 14 marks.
Mid Term II & III (Total 60 Marks, 2 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 six, out of which student has to answer any four. They are long answer type **(Not More Than 50 Words For Question Only)**, each carrying 5 marks. Total 20 marks.
• Part C: Total number of questions to be given are three, out of which student has to answer any two. They are numerical answer type / fully elaborative type **(Not More Than 70 Words For Question Only)***, each carrying 10 marks. Total 20 marks.
* LIST OF ELABORATIVE THEORY QUESTION SUBJECTS: 1 FY1 - 04 Communication Skills (Cr 2), 1 FY1 - 05 Human Values (Cr 2), 2 FY1 - 04 Communication Skills (Cr 2), 2 FY1 - 05 Human Values (Cr 2), 3 AN1 - 02 Technical Communication (Cr 2), 4 MH1 - 02 Technical Communications (Cr 2), 4 MH1 - 03 Economics and Financial Accounting (Cr 2), 5 AN5 - 12 Aircraft Maintenance Practices (Cr 2), 6 AN3 - 01 Mechanics of Composite Materials (Cr 2), 6 AN5 - 12 Aircraft Rules and Regulation (Cr 2), 6 MH3 - 01 Automobile Engineering (Cr 2).
FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER.

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 & Student Details

Mid Term	Mid Term 3	**Date of Submission**	21/09/2020
Name of Faculty	Ms. Shivi Varshney	**Date of Examination**	01/10/2020
Course	B.Tech (Mechatronics Engineering)	**Semester**	SEMESTER : 3
Batch	Fifth (5)	**Subject**	3 MH3 - 04 Electromagnetic Properties of Materials (Cr 2)

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. Solid state engineering and electronic materials: metals, semiconductors, superconductors, optical, magnetic and amorphous materials. 2. The course is meant to create the background needed to understand the physics of device operations and also prepare students for advanced courses in solid state and quantum electronics. 3. Introduce basic principles of dielectric and magnetic properties of solids. 4. Discuss dielectrics in DC and AC fields. 5. Familiarize students with magnetic disc data storage principles and technology. COURSE OUTCOME Upon completion of the course, the successful student: 1. Develops understanding of the fundamentals of polarizable solids, ferroelectricity, and magnetism. 2. Is able to relate this to the functioning of device that exploit these properties. 3. Understand how these properties may be used in device design. 4. Understand the basic electrical and magnetic properties of crystalline solids and amorphous materials. 5. Understand the difference between electronic structures and physical properties of semiconductors, metals, and dielectrics. 6. Understand the physics of magnetic phase transitions and superconductivity. 7. Measure and analyze transport characteristics of semiconductors. 8. Measure and analyze basic optical parameters of semiconductors. 9. Understand the physics behind solid state electronics and optoelectronic devices. 10. Understand the basic design of major microelectronic and optoelectronic devices, their features, and limitations. Present the results of study and research

Email I'd	shivivarshney@soaneemrana.org	**Phone No.**	701-779-6710
Student Name		**Student Reg No.**	

Part A

Question : 1		Define dielectric loss, loss tangent energy store, and loss in dynamic polarization?	
Lesson Plan No. - 1	Topic - Magnetic Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 1
Question : 2		Define soft and hard magnetic material and their application?	
Lesson Plan No. - 4	Topic - Magnetic Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 1
Question : 3		What is direct and indirect band gap semiconductor with diagrams?	
Lesson Plan No. - 15	Topic - Semiconductor Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 2
Question : 4		Describe the thermistors and sensistors?	
Lesson Plan No. - 19	Topic - Semiconductor Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 6
Question : 5		Write a Short note on, Type I and Type II superconductors?	
Lesson Plan No. - 26	Topic - Superconductors Materials	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 6
Question : 6		What is BCS theory of superconductor?	
Lesson Plan No. - 26	Topic - Superconductors	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 6
Question : 7		What is the classification of Conducting Materials?	
Lesson Plan No. - 20	Topic - Superconductors	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 6
Question : 8		write a short note on- A. Magnetostriction, B. BH hysteresis loop.	
Lesson Plan No. - 6	Topic - Magnetic Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 1
Question : 9		Explain he electrical properties of conductive and resistive materials?	
Lesson Plan No. - 23	Topic - Superconductors	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 5
Question : 10		What are Quantum dots (nano dots) and Quantum wires?	
Lesson Plan No. - 12	Topic - Nano Materials	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 3
Part B			
Question : 1		Write a short notes on following: i) Structure of quantum dots ii) Double Wall Nano tubes (DWNT) iii) Application of Nano materials.	
Lesson Plan No. - 12	Topic - Nano materials	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 3
Question : 2		Explain the bottom-up and top-down techniques with examples. What are their merits and demerits?	
Lesson Plan No. - 17	Topic - Nano materials	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 3
Question : 3		Compare the ferromagnetism and Antiferromagnetism with help of suitable diagrams?	
Lesson Plan No. - 7	Topic - Magnetic Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 1
Question : 4		What is the effect of temperature and impurities on the electrical conductivity of metals? Explain Matthiessan's rule?	
Lesson Plan No. - 23	Topic - Conductors	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 1
Question : 5		What is superconductivity? Explain the terms: Critical temperature, Critical field and Critical current density. Draw necessary diagrams.	
Lesson Plan No. - 20	Topic - Super Conductors	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 3
Question : 6		What is meant by zone refining and crystal growth? Discuss the bridgmann stockbarger technique for crystal growth.	
Lesson Plan No. - 24	Topic - Semiconductor Material	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 2

Part C	
Question : 1	A superconducting tin has a critical temperature of 3.7 K at zero magnetic field and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.

Lesson Plan No. - 27	Topic - Superconducting	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 4

Question : 2	Calculate the critical current and current density for a wire of a lead having a diameter of 1 mm at 4.2 K. The critical temperature for lead is 7.18 K and $H = 6.5 \times 10^4$ A m^{-1}.

Lesson Plan No. - 28	Topic - Superconducting	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 4

Question : 3	Find the critical current which can pass through a long thin superconducting wire of aluminum of diameter 2 mm, the critical magnetic field for aluminum is 7.9×10^3 A m^{-1}.

Lesson Plan No. - 27	Topic - superconductor	Source - Electromagnetic properties of materials by Vimi kaul	CO No. - 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.	*(signature)*