



MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)  
B. Tech. VII Semester End Examinations  
(Metallurgical and Materials Engineering)  
(Model Question Paper)

MR-21

Course Title: Introduction to Instrumentation  
Time: 3 hours

Course Code: ME731PC  
Max. Marks : 70

Note: Answer ALL Questions  
Part-A (10 x 2 = 20 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What is data logger?	2	1	1	1
1. b)	Distinguish the Data logging and data acquisition.	2	1	1	1
<b>Unit-II</b>					
1. c)	What is a manometer and how does it work?	2	2	2	1
1. d)	State the principle of LVDT and strain gauge.	2	1	2	2
<b>Unit-III</b>					
1. e)	Why does a Rota meter called as variable area flow meter? List any two forces acting on a Rota meter float	2	2	3	2
1. f)	What are the assumptions made in variable type flow meters?	2	2	3	2
<b>Unit-IV</b>					
1. g)	State the principle of dew cell.	2	1	4	1
1. h)	Enumerate the advantages of resistance type level measurement.	2	2	4	2
<b>Unit-V</b>					
1. i)	What is pH meter?	2	1	5	1
1. j)	Enumerate different types of Ion Selective Membrane.	2	1	5	2

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	With a neat block diagram, explain the working principal of digital storage oscilloscope and list the advantages of digital storage oscilloscope.	5	2	1	2
2. b)	By utilizing deflection principle explain the working of strip chart recorder with help of a neat diagram.	5	3	1	2
<b>OR</b>					
2. c)	By employing time with respect to linear ramp, explain the working of digital voltmeter with relevant diagram.	5	3	1	2
2. d)	Examine the necessity of virtual instrumentation.	5	2	1	1
<b>Unit-II</b>					
3. a)	List out different types of pressure measuring devices and explain the working of manometer.	5	2	2	1
3. b)	Describe the working principle of Capacitive type pressure gauge.	5	3	2	2
<b>OR</b>					
3. c)	By employing Boyles principle, explain how low pressure are measured with help of a neat diagram?	5	3	2	2
3. d)	Explain diaphragm type pressure gauge with neat sketch.	5	2	2	1
<b>Unit-III</b>					
4. a)	With a neat sketch, explain venturi tube flow meter.	5	2	3	1
4. b)	What is the principle used in positive displacement flow meters? With a neat sketch, illustrate the construction and working of positive displacement flow meters.	5	3	3	2
<b>OR</b>					
4. c)	What is the use of positive displacement flow meter? Explain Reciprocating piston type meter.	5	2	3	2

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4. d)	Discuss the mass flow meter that uses the principle of conservation of angular momentum. How is its range affected and how can that be counteracted?	5	3	3	2
<b>Unit-IV</b>					
5. a)	Explain the working principle of Electrolysis type hygrometer.	5	2	4	2
5. b)	Explain about Say-bolt viscometer with neat sketch.	5	2	4	2
<b>OR</b>					
5. c)	Describe about the working of seismic accelerometers and its uses.	5	3	4	2
5. d)	By employing Bubbler technique explain how level is measured with help of a neat diagram.	5	3	4	2
<b>Unit-V</b>					
6. a)	With neat block diagram, explain how does measure Smoke with suitable examples.	5	2	5	2
6. b)	Distinguish between Dust and smoke measurement.	5	3	5	1
<b>OR</b>					
6. c)	Write a short note on (i) pH meter, (ii) Sodium analyzer, (iii) H <sub>2</sub> S analyzer.	5	2	5	2
6. d)	Explain the Dissolved oxygen analyzer with neat sketches	5	3	5	2

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome



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**B.Tech. VII Semester End Examinations**  
**(Metallurgical and Materials Engineering)**  
**(Model Question Paper)**

**MR-21**

**Course Title: Corrosion Engineering of Materials**  
Time: 3 hours

**Course Code: MM701PC**  
Max. Marks : 70

*Note: Answer ALL Questions*  
*Part-A (10 x 2 = 20 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	Define Corrosion	2	2	1	1,2
1. b)	What is Null Electrode	2	1	1	1,2
<b>Unit-II</b>					
1. c)	Explain how to measure Standard Electrode Potential	2	2	1	1,2
1. d)	Define polarization and list out different possibilities of polarizations.	2	1	1	1,2
<b>Unit-III</b>					
1. e)	Classify the corrosion and list out various forms of corrosion	2	2	2	1,2
1. f)	Differentiate Uniform Corrosion and Galvanic Corrosion	2	1	2	1,2
<b>Unit-IV</b>					
1. g)	Define Inhibitors and Classify them	2	3	3	1,2
1. h)	Whis sacrificial anode and mention few metals which act as sacrificial anodes	2	3	3	1,2
<b>Unit-V</b>					
1. i)	Define Composite materials and classify them	2	3	4	1,2
1. j)	What is the mechanism of CO <sub>2</sub> Corrosion of materials	2	2	4	1,2

*Part-B (5 x 10=50 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	Differentiate between Galvanic Cell and Electrolytic Cells	5	3	1	1,2
2. b)	Define Standard Electrode Potential and Explain the method of determination using standard Hydrogen Electrode	5	2	1	1,2
<b>OR</b>					
2. c)	With a neat Diagram Explain the electrochemical mechanism of corrosion	5	2	1	1,2
2. d)	Derive Nernst equation and explain its importance	5	3	1	1,2
<b>Unit-II</b>					
3. a)	With a neat diagram explain about passivity	5	4	1	1,2
3. b)	What is the importance of over potential and explain	5	2	1	1,2
<b>OR</b>					
3. c)	Explain Different types of Galvanic cells	5	4	2	1,2
3. d)	How Galvanic serious is advantageous over EMF serious	5	4	2	1,2
<b>Unit-III</b>					
4. a)	With a neat Diagram explain the mechanism of Pitting Corrosion	5	1	2	1,2
4. b)	What are the factors influence the erosion corrosion	5	4	2	1,2
<b>OR</b>					
4. c)	What is Stress Corrosion Cracking? Explain with suitable example	5	4	2	1,2
4. d)	Explain Fretting Corrosion and knife line Corrosion	5	4	2	1,2
<b>Unit-IV</b>					
5. a)	Explain how inhibitors protect the materials from Corrosion.	5	2	3	1,2
5. b)	Explain different types of coatings used to protect the Corrosion	5	2	3	1,2
<b>OR</b>					

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5. c)	Explain the Sacrificial anode method and Impressed Current Method	5	3	3	1,2
5. d)	Explain the methodology used for organic coatings	5	1	3	1,2
Unit-V					
6. a)	Differentiate between metals, polymers, and Composite materials	5	3	4	1,2
6. b)	Explain the Corrosion behaviour of Metal matrix composites	5	2	4	1,2
OR					
6. c)	Explain the Concrete corrosion and its remedial measures	5	2	4	1,2
6. d)	How polymers gets degradation in the weathers.	5	1	4	1,2

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MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)  
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(Model Question Paper)

MR-21

Course Title: Advanced Manufacturing Techniques  
Time: 3 hours

Course Code: MM713PE  
Max. Marks : 70

Note: Answer ALL Questions  
Part-A (10 x 2 = 20 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	Define dynamic materials modelling.	2	1	1	1
1. b)	Mention the computational methods used in dynamic materials modelling.	2	2	1	1
<b>Unit-II</b>					
1. c)	What is disc rolling?	2	1	2	1
1. d)	Mention the applications of isothermal forging process.	2	2	2	1
<b>Unit-III</b>					
1. e)	Which materials are commonly used in spray forming?	2	2	3	1
1. f)	What is continuous casting?	2	1	3	1
<b>Unit-IV</b>					
1. g)	What is rapid solidification process?	2	1	4	1
1. h)	Give an application where single crystal components are used.	2	1	4	1
<b>Unit-V</b>					
1. i)	What is the principle involved in magnetic arc welding?	2	1	5	1
1. j)	Mention the materials that are joined by microwave joining.	2	1	5	1

Part-B (5 x 10 = 50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	How do strain rate and temperature influences the dynamic behaviour of materials?	5	3	1	1,2
2. b)	What are processing maps? Explain the requirements of a processing map.	5	3	1	1
<b>OR</b>					
2. c)	What are the primary objectives of dynamic materials modelling in manufacturing processes?	5	3	1	1,2
2. d)	Provide an example to illustrate where identifying a safe window of processing is crucial.	5	4	1	1
<b>Unit-II</b>					
3. a)	Explain the advantages of disc rolling over traditional rolling methods.	5	2	2	1
3. b)	What are the benefits and applications of incremental forging process?	5	2	2	1
<b>OR</b>					
3. c)	Explain the advantages and disadvantages of severe plastic deformation processes.	5	2	2	1
3. d)	Explain in detail about isothermal forging process.	5	2	2	1
<b>Unit-III</b>					
4. a)	How is atomization of the molten metal achieved in spray forming	5	3	3	1
4. b)	How does HIP differ from other densification techniques in powder metallurgy?	5	3	3	1
<b>OR</b>					
4. c)	What are the advantages and disadvantages of additive manufacturing?	5	2	3	1
4. d)	Broadly classify metal powder techniques.	5	2	3	1

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<b>Unit-IV</b>					
5. a)	By means of a neat sketch explain the manufacturing of single crystal component.	5	2	4	1
5. b)	Mention the products that are typically manufactured using continuous casting.	5	2	4	1
<b>OR</b>					
5. c)	Write short notes on rapid solidification of metals.	5	2	4	1
5. d)	Explain the process of directional solidification and mention its advantages.	5	2	4	1
<b>Unit-V</b>					
6. a)	Explain the advantages and applications of narrow gap laser welding	5	2	5	1
6. b)	Mention the differences between laser hybrid welding and laser welding process.	5	3	5	1
<b>OR</b>					
6. c)	Explain microwave welding process.	5	2	5	1
6. d)	What is magnetic arc welding?	5	2	5	1

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MR-21

Course Title: Light Metals and Alloys  
Time: 3 hours

Course Code: MM715PE  
Max. Marks : 70

Note: Answer ALL Questions  
Part-A (10 x 2 = 20 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What are light metals	2	2	1	1,2
1. b)	Explain about Strengthening by grain refinement	2	1	1	1,2
<b>Unit-II</b>					
1. c)	Classify Aluminium alloys	2	2	1	1,2
1. d)	Write four applications of Aluminium alloys	2	1	1	1,2
<b>Unit-III</b>					
1. e)	Describe powder metallurgy	2	2	2	1,2
1. f)	Write about different processing routes of Aluminim Alloys	2	1	2	1,2
<b>Unit-IV</b>					
1. g)	What are the roles of Al and V in Ti alloys	2	3	3	1,2
1. h)	Classify Ti alloys	2	3	3	1,2
<b>Unit-V</b>					
1. i)	Short notes on Mg alloys	2	3	4	1,2
1. j)	What are the applications of Be alloys	2	2	4	1,2

Part-B (5 x 10=50 Marks)

<b>Unit-I</b>					
2. a)	Describe the solid solution strengthening mechanisms in metals and alloys with suitable figures	5	3	1	1,2
2. b)	What are the major applications of light metals and alloys explain with case studies	5	2	1	1,2
<b>OR</b>					
2. c)	Describe the dispersion strengthening mechanisms in metals and alloys with suitable figures	5	2	1	1,2
2. d)	Describe the strengthening mechanisms by work hardening in metals and alloys with suitable figures	5	3	1	1,2
<b>Unit-II</b>					
3. a)	Write about the Al-Si alloys composition, heat treatment and applications	5	4	1	1,2
3. b)	Compare heat treatable and non heat treatable Al alloys	5	2	1	1,2
<b>OR</b>					
3. c)	Describe one Al-Zn and Al-Mn alloy by giving their composition, heat treatment and applications	5	4	2	1,2
3. d)	Explain in detail Al-Cu alloy ageing behaviour with the help of phase digram	5	4	2	1,2
<b>Unit-III</b>					
4. a)	What is rapid solidification and how it is different from conventional solidification techniques	5	1	2	1,2
4. b)	Explain atomisation of powders with suitable figures	5	4	2	1,2
<b>OR</b>					
4. c)	Discuss about the 2 high strength Al alloys in detail by their composition, processing and applications	5	4	2	1,2
4. d)	What are different processing techniques used in manufacturing Al alloys and describe about any two in detail	5	4	2	1,2
<b>Unit-IV</b>					

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5. a)	Classify Ti alloys and properties and applications and commercially pure Ti alloys	5	2	3	1,2
5. b)	Heat treatment, Properties and applications of Ti-6Al-4V alloy with suitable figures	5	2	3	1,2
OR					
5. c)	How do you process Ti alloys and what are they, explain about one processing technique in detail	5	3	3	1,2
5. d)	Heat treatment, Properties and applications of Ti-8Al-1Mo-1V Ti-5553 alloys;	5	1	3	1,2
Unit-V					
6. a)	Write about Beryllium alloys Classification properties and applications	5	3	4	1,2
6. b)	Write about Corrosion resistance of Mg-alloys	5	2	4	1,2
OR					
6. c)	Write important applications and properties of Mg-Sn, Mg-Zn alloys	5	2	4	1,2
6. d)	Write important applications and properties of Mg-Gd, Mg-Li systems	5	1	4	1,2

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**B.Tech. VII Semester End Examinations**  
**(Common to ME & MME)**  
**(Model Question Paper)**

**MR-21**

**Course Title: Electrical Systems and Safety**  
Time: 3 hours

**Course Code: EE722OE**  
Max. Marks : 70

*Note: Answer ALL Questions*  
*Part-A (10 x 2 = 20 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
1. a)	What are the different types of cables?	2	4	1	1
1. b)	What are the IE rules for domestic wiring?	2	5	1	1
<b>Unit-II</b>					
1. c)	What are the advantages of earthing?	2	2	2	2
1. d)	Give two examples for electrical Hazards?	2	3	2	2
<b>Unit-III</b>					
1. e)	Where are the parts of substation?	2	1	3	1
1. f)	What is the purpose of circuit breaker?	2	1	3	2
<b>Unit-IV</b>					
1. g)	What is tariff?	2	1	4	2
1. h)	What are the types of Tariff?	2	1	4	2
<b>Unit-V</b>					
1. i)	Define the term Solid angle and give its formula?	2	2	5	3
1. j)	Define the term illumination and give its formula?	2	2	5	3

*Part-B (5 x 10=50 Marks)*

Q. No.	Stem of the Question	M	L	CO	PO
<b>Unit-I</b>					
2. a)	What are the Types of wires, specifications, types of wiring systems and explain them with neat diagram?	5	1	1	1
2. b)	Explain the different types of H.T cables with diagrams?	5	1	1	2
<b>OR</b>					
2. c)	Explain the IE rules for domestic and industrial wiring?	5	1	1	2
2. d)	Explain the types of electrical distribution systems with neat diagram?	5	1	1	3
<b>Unit-II</b>					
3. a)	Explain the Effects of electrical parameters on human body?	5	2	2	3
3. b)	What are the Indian standards for earthing?	5	2	2	3
<b>OR</b>					
3. c)	Explain the different types of earthing with neat diagram?	5	3	2	2
3. d)	What are the Safety measures for electric shock?	5	2	2	2
<b>Unit-III</b>					
4. a)	What are the main parts of substation?	5	3	3	3
4. b)	Explain the Gas insulated substation with neat diagram?	5	3	3	2
<b>OR</b>					
4. c)	Draw and explain the single line diagram of substation?	5	4	3	1
4. d)	What are the difference between GIS and AIS?	5	3	3	1
<b>Unit-IV</b>					
5. a)	Explain its advantages and disadvantages about Flat rate tariff?	5	2	4	2
5. b)	Explain its advantages and disadvantages about Three-part tariff?	5	2	4	3

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<b>OR</b>					
5. c)	Explain its advantages and disadvantages about Block rate tariff with one example?	5	3	4	1
5. d)	The maximum demand of a consumer is 20 A at 220 V and his total energy consumption is 8760 kWh. If the energy is charged at the rate of 20 paise per unit for 500 hours use of the maximum demand per annum plus 10 paise per unit for additional units, calculate: (i) annual bill (ii) equivalent flat rate.	5	2	4	2
<b>Unit-V</b>					
6. a)	Explain laws of Illumination?	5	4	5	1
6. b)	Explain the working of Sodium Vapour Lamp with the neat diagram?	5	2	5	2
<b>OR</b>					
6. c)	Explain the working of Fluorescent Lamp with the neat diagram?	5	5	5	2
6. d)	Explain the working of Mercury Vapour Lamp with the neat diagram?	5	2	5	3

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