

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3		Sheet No. 1/3	
Branch	MECHANICAL ENGINEERING			Semester	III		
Course Code	303	Course Name	MATERIAL SCIENCE & ENGINEERING				
Course Outcome 1	Explain engineering materials and their properties.					Teach Hrs	Marks
Learning Outcome 1	Classify engineering materials on the basis of mechanical properties.					05	05
Contents	Introduction to engineering materials, classification of engineering materials and their mechanical properties						
Method of Assessment	Paper pen test						
Learning Outcome 2	Illustrate seven basic crystal systems.					06	08
Contents	Unit cell and space lattice, seven basic crystal systems- triclinic, monoclinic, orthorhombic, tetragonal, trigonal, hexagonal, and cubic.						
Method of Assessment	Theory exam						
Learning Outcome 3	Explain crystal structures of metallic elements.					05	08
Contents	Crystal structure for metallic elements: simple cubic, BCC, FCC, HCP and its coordination number, crystal imperfections and its effect on mechanical properties of metals.						
Method of Assessment	Theory exam						
Course Outcome 2	Explain iron carbon equilibrium diagram, TTT curve, heat treatment processes					Teach Hrs	Marks
Learning Outcome 1	Explain solidification, re-crystallization, phase rule, lever rule.					05	05
Contents	Process of nucleation and grain growth, ingot solidification, dendritic and columnar structure, segregation of impurities, grain and grain boundaries, Re-crystallization, phase rule, lever rule and its applications.						
Method of Assessment	Paper pen test						

Learning Outcome 2	Interpret Iron-Carbon equilibrium diagram, TTT curve.	08	08
Contents	Phase transformations– Eutectic Eutectoid, Peritectic, Peritectoid Iron-carbon equilibrium diagram, The solidification and cooling of carbon steels and its structures, effect of carbon content on mechanical properties of steel. TTT curve.		
Method of Assessment	Theory exam		
Learning Outcome 3	Explain heat treatment processes for metals.	08	10
Contents	Objectives of heat treatment, thermal processes: annealing, normalizing, hardening and tempering. Hardening process: Surface hardening, flame hardening, case hardening methods and its uses, limitations and advantages, quenching mediums and their effect on hardness, Hardening defects, hardenability.		
Method of Assessment	Theory exam		
Course Outcome 3	Select ferrous and non ferrous metals and its alloy for engineering materials.	Teach Hrs	Marks
Learning Outcome 1	Explain properties and uses of ferrous metals and its alloys.	06	10
Contents	Cast irons, their properties and uses, composition and uses of plain carbon steels, effect of impurities, Alloy steels and its alloying elements, effects of alloying elements on properties and uses of steels.		
Method of Assessment	Paper pen test		
Learning Outcome 2	Explain properties and uses of non ferrous metals and its alloys.	06	10
Contents	Copper and its alloy: brass, bronze, gun metal Its composition, Properties and uses. Aluminium and its Alloys :Hindalium, Duralumin, Y-alloy its composition, properties and uses Nickel and its alloy : nickel-molybdenum, nickel-chromium Its composition, Properties and uses Zinc and its alloy: zinc-Al casting alloy, zinc-lead alloy Its composition, Properties and uses		
Method of Assessment	Theory exam		
Course Outcome 4	Explain properties of non metallic materials and plastics.	Teach Hrs	Marks

Learning Outcome 1	Describe the properties and uses of ceramics, rubbers, glasses	06	08
Contents	Introduction, classification, properties, uses of Ceramic Refractories, Rubbers, glasses		
Method of Assessment	Theory exam		
Learning Outcome 2	Compare thermosetting plastic and thermoplastic.	05	06
Contents	Properties, Composition, and uses of plastics: thermosetting plastic and thermoplastic		
Method of Assessment	Theory exam		
Learning Outcome 3	Explain plastic processing methods.	06	10
Contents	Types, uses of different plastic processing methods: injection moulding, blow moulding compression moulding, extrusion, forming , casting		
Method of Assessment	Term Work		
Course Outcome 5	Select appropriate metal preservation techniques in a given situation.	Teach Hrs	Marks
Learning Outcome 1	Explain corrosion and its minimization techniques.	04	05
Contents	Nature of corrosion and its causes, methods of minimizing corrosion		
Method of Assessment	Theory exam		
Learning Outcome 2	Describe different metal preservation techniques.	05	07
Contents	Surface coating techniques: hot dipping, electroplating, spraying, diffusion coating, cleaning and finishing of metal surfaces.		
Method of Assessment	Theory exam		

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>1</i>		<i>1</i>		4
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Explain engineering materials and their properties.													
LO Description		Classify engineering materials on the basis of mechanical properties.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Introduction to engineering materials, classification of engineering materials and their mechanical properties.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students; teacher will conduct a quiz and give assignments to practice their knowledge.					05	00	Text book, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Paper pen test	Students will be asked to explain any two mechanical properties and the classification of engineering materials.					05	Test paper + rating scale			Internal				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
Part of Progressive test 1															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>1</i>	<i>2</i>	<i>4</i>
COURSE NAME	MATERIAL SCIENCE AND ENGINEERING												
CO Description	Explain engineering materials and their properties.												
LO Description	Illustrate seven basic crystal systems.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks		
1.	Unit cell and space lattice, seven basic crystal systems- triclinic, monoclinic, orthorhombic, tetragonal, trigonal, hexagonal, and cubic.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct a quiz and give assignments to practice their knowledge.					06	00	Text book, video lectures, chalk board, Models.	NIL		
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal				
1.	Theory exam	Students will be asked to explain unit cell, space lattice and any two basic crystal systems.					08	Question paper + rating scale	External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
NIL													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>1</i>	<i>3</i>	<i>4</i>
COURSE NAME	MATERIAL SCIENCE AND ENGINEERING												
CO Description	Explain engineering materials and their properties.												
LO Description	Explain crystal structures of metallic elements.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks		
1.	Crystal structure for metallic elements: simple cubic, BCC, FCC, HCP and its coordination number, crystal imperfections and its effect on mechanical properties of metals.	Interactive classroom teaching, assignments, quiz, presentation,	Teacher will explain the contents and provide handouts to the students; teacher will conduct a quiz and give assignments to practice their knowledge.					05	00	Text book, charts, video lectures, chalk board, models, tables.	NIL		
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required		External / Internal			
1.	Theory exam	Students will be asked to explain any one crystal structure and effect of any one crystal imperfection on mechanical properties of metal.					08	Question paper + rating scale		External			
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
NIL													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>2</i>	<i>1</i>	4		
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Explain iron carbon equilibrium diagram, TTT curve, heat treatment processes													
LO Description		Explain solidification, re–crystallization, phase rule, lever rule.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Process of nucleation and grain growth, ingot solidification, dendritic and columnar structure, segregation of impurities, grain and grain boundaries, Re-crystallization, phase rule, lever rule and its applications.	Interactive classroom teaching, assignments, quiz, presentation,	Teacher will explain the contents and provide handouts to the students, teacher will conduct a quiz and give assignments to practice their knowledge.					05	00	Text book, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Paper pen test	Students will be asked to explain re-crystallization, phase rule/ lever rule.					05	Test paper+ Rating scale			Internal				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
Part of Progressive test I															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>2</i>	<i>2</i>	<i>4</i>		
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Explain iron carbon equilibrium diagram, TTT curve, heat treatment processes.													
LO Description		Interpret Iron-Carbon equilibrium diagram, TTT curve.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Phase transformations– Eutectic Eutectoid, Peritectic, Peritectoid Iron-carbon equilibrium diagram, The solidification and cooling of carbon steels and its structures, effect of carbon content on mechanical properties of steel. TTT curve.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct a quiz and give assignments to practice their knowledge.					08	00	Text book, charts, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Theory exam	Students will be asked to draw and explain iron carbon equilibrium diagram or TTT curve					08	Question paper + rating scale			External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
NIL															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>2</i>	<i>3</i>	4		
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Explain iron-carbon equilibrium diagram, TTT curve, heat treatment processes.													
LO Description		Explain heat treatment processes for metals.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Objectives of heat treatment, thermal processes: annealing, normalizing, hardening and tempering. Hardening process: Surface hardening, flame hardening, case hardening methods and its uses, limitations and advantages, quenching mediums and their effect on hardness, Hardening defects, hardenability.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct a quiz and give assignments to practice their knowledge.					08	00	Text book, charts, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Theory exam	Students will be asked to explain one thermal process and one hardening process of heat treatment					10	Question paper + rating scale			External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
NIL															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code		Course Code			CO Code	LO Code	Format No.	
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>3</i>	<i>1</i>	4
COURSE NAME	MATERIAL SCIENCE AND ENGINEERING												
CO Description	Select ferrous and non ferrous metals and its alloy for engineering materials.												
LO Description	Explain properties and uses of ferrous metals and its alloys.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks		
1.	Cast irons, their properties and uses, composition and uses of plain carbon steels, effect of impurities, Alloy steels and its alloying elements, effects of alloying elements on properties and uses of steels.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct a quiz and give assignments to practice their knowledge..					06	00	Text book, video lectures, chalk board, tables.	NIL		
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required		External / Internal			
1.	Paper pen test	Students will be asked to explain: (1) Properties, composition, uses of one cast iron / carbon steel. (2) One alloying element its effect on properties and uses of steel.					10	Test paper+ Rating scale		Internal			
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of progressive test II													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>3</i>	<i>2</i>	<i>4</i>
COURSE NAME	MATERIAL SCIENCE AND ENGINEERING												
CO Description	Select ferrous and non ferrous metals and its alloy for engineering materials.												
LO Description	Explain properties and uses of non ferrous metals and its alloys.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks		
1.	Copper and its alloy: brass, bronze, gun metal its composition, properties and uses. Aluminum and its alloys: Hindalium, Duralumin, Y-alloy its composition, properties and uses Nickel and its alloy : nickel-molybdenum, nickel-chromium Its composition, Properties and uses Zinc and its alloy: zinc-Al casting alloy , zinc-lead alloy its composition, Properties and uses	Interactive classroom teaching, assignments, quiz, presentation.	Teacher will explain the contents and provide handouts to the students; teacher will conduct a quiz and give assignments to practice their knowledge.					06	00	Text book, video lectures, chalk board, tables.	NIL		
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required		External / Internal			
1.	Theory exam	Students will be asked to describe composition, properties and uses of any two metals /alloys.					10	Question paper + rating scale		External			
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
NIL													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>4</i>		<i>1</i>		4
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Explain properties of non metallic materials and plastics.													
LO Description		Describe the properties and uses of ceramics, rubbers, glasses.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Introduction, classification, properties, uses of ceramic refractories, rubbers, glasses.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct quiz and give assignments to practice their knowledge.					06	00	Text book, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Theory exam	Students will be asked to explain any two of non metallic materials.					08	Question paper + rating scale			External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
NIL															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>4</i>		<i>2</i>		<i>4</i>
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Explain properties of non metallic materials and plastics.													
LO Description		Compare thermosetting plastic and thermoplastic.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Properties, Composition, and uses of plastics: thermosetting plastic and thermoplastic	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct quiz and give assignments to practice their knowledge.					05	00	Text book, video lectures, chalk board, tables.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Theory exam	Students will be asked to compare thermosetting plastic and thermoplastic.					06	Question paper + rating scale			External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
NIL															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>4</i>	<i>3</i>	<i>4</i>
COURSE NAME	MATERIAL SCIENCE AND ENGINEERING												
CO Description	Explain properties of non metallic materials and plastics.												
LO Description	Explain plastic processing methods.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1.	Types, uses of different plastic processing methods: injection moulding, blow moulding compression moulding, extrusion, forming, casting.	Interactive classroom teaching, assignments, quiz, presentation.	Teacher will explain the contents and provide handouts to the students; teacher will conduct a quiz and give assignments to practice their knowledge.	06	00	Text book, video lectures, chalk board.	NIL						
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required	External / Internal						
1.	Quiz	Students will be asked to explain one plastic processing method.			10	Quiz + rating scale	Internal						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Term work													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>5</i>		<i>1</i>		<i>4</i>
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Select appropriate metal preservation techniques in a given situation.													
LO Description		Explain corrosion and its minimization techniques.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Nature of corrosion and its causes, methods of minimizing corrosion.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct quiz and give assignments to practice their knowledge.					04	00	Text book, charts, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Theory exam	Students will be asked to list causes of corrosion and methods of minimizing corrosion.					05	Question paper + rating scale			External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
NIL															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No.
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>5</i>	<i>2</i>	4		
COURSE NAME		MATERIAL SCIENCE AND ENGINEERING													
CO Description		Select appropriate metal preservation techniques in a given situation.													
LO Description		Describe different metal preservation techniques.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1.	Surface coating techniques: hot dipping, electroplating, spraying, diffusion coating, cleaning and finishing of metal surfaces.	Interactive classroom teaching, assignments, quiz, presentation	Teacher will explain the contents and provide handouts to the students, teacher will conduct a quiz and give assignments to practice their knowledge..					05	00	Text book, charts, video lectures, chalk board.			NIL		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required			External / Internal				
1.	Theory exam	Students will be asked to explain one metal preservation technique.					07	Question paper + rating scale			External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
NIL															