GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **METALLURGICAL ENGINNERING**

COURSE CODE: **MTG 309** COURSE NAME: **FURNACE REFRACTORIES & PYROMETERY**

MAX. MARKS: **80** TIME: **3 HRS.** DATE:**24/05 /2023**

Instruction :-

1) Answer two sections must be written in separate section answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**-Question No, **SQN**-Sub-Question No, **R**- Remembering, **U**-Understanding, **A**-Application **CO**-Course outcome

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QN	SQN	QUESTION TEXT	RUA	CO MTG 309	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define 'Refractory'. Give one example.	R		
	b)	Enlist various Test conducted on Refractories.	U		
	c)	Why acidic Refractories not suitable for Basic slagmaking practices?	U		
	d)	State two uses of Refractories.	A		
	e)	Enlist various furnace auxillary.	R		
	f)	State advantages of cupola furnace.	A		
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain Furnace classification. State role of Burners & control valve as furnace auxillaries.	U		
	b)	Distinguish between Direct Arc furnace & Indirect Arc furnace in term of Energy consumption, Advantages, Disadvantages & applications. (1 point each)	R		
	c)	Enlist various types of Refractories. What is mean by 'Refractoriness'.	U		
	d)	Explain Four reasons of refractory failure.	U		
	e)	Write down advantages (two) & disadvantages of Rotary furnace.	A		
	f)	Explain role of fan & damper in furnace.	A		
Q.3		Attempt any **FOUR**			**(16)**
	a)	Explain classification of Furnace. State name of Furnace & its functions.	R		
	b)	Explain working & advantages of Pit furnace.	R		
	c)	Explain two advantages & application of crucible furnace.	A		
	d)	Write principle of Box type furnace. State its uses.	U		
	e)	Write two advantages & disadvantages of rotary furnace.	A		
	f)	What id mean by 'Furnace atmosphere'. State its role.	R		

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - THIRD PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG309

COURSE NAME: - FURNACE, REFRACTORIES AND PYROMETRY

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -24/05/2023

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write advantages of electric arc furnace.	A	4	2
	b)	State the principle of Electric arc furnace. Name its types.	R	4	2
	c)	Write working of oil fired crucible furnace.	U	5	2
	d)	State applications of crucible furnace.	A	5	2
	e)	List various temperature measurement equipment or tools.	U	6	2
	f)	Define thermocouple. Write its different types.	R	6	2
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain working of indirect arc furnace.	U	4	4
	b)	Write application of induction furnace.	A	4	4
	c)	Describe refractory material used for various zones in direct arc furnace.	U	4	4
	d)	Define crucible .Draw neat labelled diagram gas fired crucible furnace.	U	5	4
	e)	Explain construction of total radiation pyrometer.	U	6	4
	f)	Describe working of any one type of thermocouple.	U	6	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe working of Total radiation pyrometer.	U	6	4
	b)	Explain principle and application of resistance pyrometer.	A	6	4
	c)	Explain with neat diagram construction of optical pyrometer.	U	6	4
	d)	Define Pit furnace. Explain construction of coke fired pit furnace.	R	5	4
	e)	Explain construction of direct arc furnace.	U	4	4
	f)	Write principle and working of indirect furnace.	R	4	4

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **METALLURGICAL ENGINNERING**

COURSE CODE: **MTG 309** COURSE NAME: **FURNACE REFRACTORIES & PYROMETERY**

MAX. MARKS: **80** TIME: **3 HRS.** DATE:**24/05 /2023**

Instruction :-

1) Answer two sections must be written in separate section answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**-Question No, **SQN**-Sub-Question No, **R**- Remembering, **U**-Understanding, **A**-Application **CO**-Course outcome

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QN	SQN	QUESTION TEXT	RUA	CO MTG 309	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define 'Refractory'. Give one example.	R		
	b)	Enlist various Test conducted on Refractories.	U		
	c)	Why acidic Refractories not suitable for Basic slagmaking practices?	U		
	d)	State two uses of Refractories.	A		
	e)	Enlist various furnace auxillary.	R		
	f)	State advantages of cupola furnace.	A		
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain Furnace classification. State role of Burners & control valve as furnace auxillaries.	U		
	b)	Distinguish between Direct Arc furnace & Indirect Arc furnace in term of Energy consumption, Advantages, Disadvantages & applications. (1 point each)	R		
	c)	Enlist various types of Refractories. What is mean by 'Refractoriness'.	U		
	d)	Explain Four reasons of refractory failure.	U		
	e)	Write down advantages (two) & disadvantages of Rotary furnace.	A		
	f)	Explain role of fan & damper in furnace.	A		
Q.3		Attempt any **FOUR**			**(16)**
	a)	Explain classification of Furnace. State name of Furnace & its functions.	R		
	b)	Explain working & advantages of Pit furnace.	R		
	c)	Explain two advantages & application of crucible furnace.	A		
	d)	Write principle of Box type furnace. State its uses.	U		
	e)	Write two advantages & disadvantages of rotary furnace.	A		
	f)	What id mean by 'Furnace atmosphere'. State its role.	R		

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - THIRD PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG309

COURSE NAME: - FURNACE, REFRACTORIES AND PYROMETRY

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -24/05/2023

QN	SQN	**SECTION –II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
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	b)	State the principle of Electric arc furnace. Name its types.	R	4	2
	c)	Write working of oil fired crucible furnace.	U	5	2
	d)	State applications of crucible furnace.	A	5	2
	e)	List various temperature measurement equipment or tools.	U	6	2
	f)	Define thermocouple. Write its different types.	R	6	2
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain working of indirect arc furnace.	U	4	4
	b)	Write application of induction furnace.	A	4	4
	c)	Describe refractory material used for various zones in direct arc furnace.	U	4	4
	d)	Define crucible .Draw neat labelled diagram gas fired crucible furnace.	U	5	4
	e)	Explain construction of total radiation pyrometer.	U	6	4
	f)	Describe working of any one type of thermocouple.	U	6	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe working of Total radiation pyrometer.	U	6	4
	b)	Explain principle and application of resistance pyrometer.	A	6	4
	c)	Explain with neat diagram construction of optical pyrometer.	U	6	4
	d)	Define Pit furnace. Explain construction of coke fired pit furnace.	R	5	4
	e)	Explain construction of direct arc furnace.	U	4	4
	f)	Write principle and working of indirect furnace.	R	4	4

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - THREE PROGRAM: METALLURGICAL ENGG

COURSE CODE:-MTG301

COURSE NAME:-METALLURGICAL THERMODYANAMICS

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: 24 /05/ **23**

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State mathematical expression of entropy	R	3	
	b)	Define henry's law.	R	4	
	c)	State Sieverts' law	R	4	
	d)	Define equilibrium constant	U	4	
	e)	Define activity coefficient	R	4	
	f)	State the uses of Ellingham diagram	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write Kelvin and Plank statement and mathematical expression of second law of thermodynamics. Give industrial applications of these law.	R	3	
	b)	State Zeroth law of thermodynamics. Explain the importance of it.	R	4	
	c)	Describe the importance of intersecting lines on Ellingham diagram.	R	5	
	d)	Draw Ellingham diagram for oxides	R	5	
	e)	Calculate the entropy change for the following reaction $CO_{(g)} + 2H_2 \rightarrow CH_3OH$ ▲ S for CO= 197 J/mol K ▲ S for for H_2 = 130.7 J/mol K ▲ CH_3OH = 127.2 J/mol K	A	4	
	f)	Explain the concept of entropy.	U	3	
Q.6		Attempt any **TWO:**			**16**
	a)	Give significance of Ellingham diagram briefly.	U	5	
	b)	Define equilibrium constant give mathematical expression for the same. Give applications of equilibrium constant.	R	4	
	c)	Formulate mathematical expression of combined statement of first and second law of thermodynamics.	R	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : THREE PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG301

COURSE NAME :- METALLURGICAL THERMODYANAMICS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-24 /05/2023

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
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6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**SECTION -I**	R/U/A	CO MTG 301	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Thermodyanamics	R	1	
	b)	Define state of a system	U	1	
	c)	Define specific heat at constant pressure	R	2	
	d)	State first law of thermodyanamics	U	2	
	e)	Define enthalpy.Give its SI unit.	R	2	
	f)	Define energy	U	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	State different forms of energy	R	1	
	b)	State and explain types of system.	U	1	
	c)	State applications of Hess law.	A	2	
	d)	Give relation between Cp and Cv mathematically.	R	2	
	e)	Prove $C_V = DU/DT$ at constant volume.	R	2	
	f)	Define system, surroundings and boundry.Give examples.	U	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the types of equlibrium.	U	1	
	b)	Define process. State its types and explain.	U	1	
	c)	Define Hess law state its significance.	R	2	
	d)	Explain exothermic reactions with examples.	R	2	
	e)	Explain internal energy as a state property.	U	2	
	f)	Differentiate between point function and path function	R	1	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : THREE PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG301

COURSE NAME :- METALLURGICAL THERMODYANAMICS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-24 /05/2023

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
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QN	SQN	**SECTION -I**	R/U/A	CO MTG 301	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Thermodyanamics	R	1	
	b)	Define state of a system	U	1	
	c)	Define specific heat at constant pressure	R	2	
	d)	State first law of thermodyanamics	U	2	
	e)	Define enthalpy.Give its SI unit.	R	2	
	f)	Define energy	U	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	State different forms of energy	R	1	
	b)	State and explain types of system.	U	1	
	c)	State applications of Hess law.	A	2	
	d)	Give relation between Cp and Cv mathematically.	R	2	
	e)	Prove $C_V = DU/DT$ at constant volume.	R	2	
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	a)	Explain the types of equlibrium.	U	1	
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	c)	Define Hess law state its significance.	R	2	
	d)	Explain exothermic reactions with examples.	R	2	
	e)	Explain internal energy as a state property.	U	2	
	f)	Differentiate between point function and path function	R	1	

P.T.O.

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~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - THREE PROGRAM: METALLURGICAL ENGG

COURSE CODE:-MTG301

COURSE NAME:-METALLURGICAL THERMODYANAMICS

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: 24 /05/ **23**

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State mathematical expression of entropy	R	3	
	b)	Define henry's law.	R	4	
	c)	State Sieverts' law	R	4	
	d)	Define equilibrium constant	U	4	
	e)	Define activity coefficient	R	4	
	f)	State the uses of Ellingham diagram	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write Kelvin and Plank statement and mathematical expression of second law of thermodynamics. Give industrial applications of these law.	R	3	
	b)	State Zeroth law of thermodynamics. Explain the importance of it.	R	4	
	c)	Describe the importance of intersecting lines on Ellingham diagram.	R	5	
	d)	Draw Ellingham diagram for oxides	R	5	
	e)	Calculate the entropy change for the following reaction $CO_{(g)} + 2H_2 \rightarrow CH_3OH$ ▲ S for CO= 197 J/mol K ▲ S for for H_2 = 130.7 J/mol K ▲ CH_3OH = 127.2 J/mol K	A	4	
	f)	Explain the concept of entropy.	U	3	
Q.6		Attempt any **TWO:**			**16**
	a)	Give significance of Ellingham diagram briefly.	U	5	
	b)	Define equilibrium constant give mathematical expression for the same. Give applications of equilibrium constant.	R	4	
	c)	Formulate mathematical expression of combined statement of first and second law of thermodynamics.	R	3	

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG303**

COURSE NAME **METALLURGICAL ANALYSIS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **09/ 06 / 2023**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MTG 303	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define the term solubility product.	R	2	
	b)	What is mean by sampling of material?	U	1	
	c)	Define the terms precipitate, precipitant and precipitation in gravimetric analysis.	U	2	
	d)	What is mean by qualitative analysis?	U	1	
	e)	Enlist the equipments used in chemical lab.	A	1	
	f)	Enlist the steps of gravimetric analysis.	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	What are the requirements or characteristics of precipitate?	U	2	
	b)	Explain in detail the presentation or classification of qualitative analysis and quantitative analysis.	R	1	
	c)	Calculate at what PH precipitate of Magnesium hydroxide reaches completeness. SP ($Mg(OH)_2$) = 5 X 10^{-12}M.	A	2	
	d)	Explain the filteration and washing of precipitate in gravimetric analysis.	A	2	
	e)	Explain the process of sampling for cast iron from scrap.	A	1	
	f)	Explain the terms error, precision and accuracy in chemical analysis in detail	U	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the difference between classical method of analysis and instrumental method of analysis.	U	1	
	b)	Explain the drying and ignition and calculation in gravimetric analysis of weighed precipitate.	A	2	
	c)	Explain in detail conditions of precipitation.	U	2	
	d)	State the necessity of metallurgical analysis in foundry.	R	1	
	e)	Explain in detail co-precipitation with example.	R	2	
	f)	Explain the steps of sampling for the materials used in metallurgical analysis.	A	1	

P.T.O

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : Diploma In Metallurgical Engineering

COURSE CODE :- MTG 303

COURSE NAME :- Metallurgical Analysis

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-09/06/ **23**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
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QN	SQN	**SECTION -II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State principle of volumetric analysis.	U	3	02
	b)	State advantages of volumetric analysis.	R	3	02
	c)	List equipments/instrument used in chemical lab(Met).	U	4	02
	d)	State two benefits of instrumental analysis.	A	4	02
	e)	State advantages of foundry material analysis.	U	5	02
	f)	Which method used to determine % si in Fe-Si alloy?	R	5	02
Q.5		Attempt any **FOUR:**			**16**
	a)	Define term (a) titration curve (b) Indicator	U	3	**04**
	b)	Draw & explain titration curve of strong acid & weak base.	R	3	04
	c)	Explain uses and principle of atomic absorption spectrometer.	R	4	04
	d)	Explain procedure of carbon determination by combustion method.	A	4	04
	e)	State 4 importance of analysis of foundry materials.	U	5	04
	f)	State procedure to determine mg in S G.iron.	R	5	04
Q.6		Attempt any **FOUR:**			**16**
	a)	Why vaccum needed in vaccum emission spectrometer. State two advantages.	A	4	04
	b)	Draw sketch of emission spectrometer. Labeled various parts.	R	4	04
	c)	State four advantages of instrumental analysis.	A	4	04
	d)	Explain various requirement of volumetric analysis.	U	3	04
	e)	State types of indicators. What is relation between indictor PH & Equivalence point PH.	R	3	**04**
	f)	State two disadvantages 'of volumetric analysis.	U	3	**04**

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG307/MTF307**

COURSE NAME **PHYSICAL METALLURGY-I**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **08/ 06 / 2023**

Instruction :-

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7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/ U/ A	Co **MTG 307**	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Bravais lattice.	R	1	
	b)	Mention the atomic packing factor of S.C. and B.C.C. structures.	R	1	
	c)	Explain the term-'phase'.	R	1	
	d)	Define cooling curve. Draw cooling curve for pure metal.	R	2	
	e)	Enlist the types of phase transformation reactions in Fe-C equilibrium diagram. Mention their temperatures.	R	3	
	f)	State the properties of Ferrite.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw a neat sketch of F.C.C. crystal structure and calculate average number of atoms per unit cell for it.	U	1	
	b)	Define solid solution. Explain its types and give examples of each type.	R/ A	1	
	c)	State and explain Hume Rothery's rules for formation of solid solutions.	U	1	
	d)	Explain the use of Lever rule in an isomorphous system.	U/ A	2	
	e)	With neat diagram, explain different allotropic forms of iron. State temperatures, crystal structures and properties of each form.	U	3	
	f)	State the necessity of etching of specimen. Give compositions of commonly used etching reagents for steels (any two)	U/ A	4	
Q.3		Attempt any **FOUR:**			**16**
	a)	State and explain Gibb's phase rule with its application.	U/ A	1	
	b)	Explain the mechanism of nucleation and growth during solidification of pure metals.	U	1	
	c)	Describe binary off-eutectic alloys with cooling curve.	U	2	
	d)	Draw and explain equilibrium of a layer type system.	U	2	
	e)	Define 'steels'. Explain its types based on Fe-C equilibrium diagram, with their compositions and properties.	U	3	
	f)	Explain the procedure for Hot mounting of specimen.	U	4	

P.T.O

QN	SQN	Question Text	R/U/A	Co MTG 309	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write the types of Grey C.I. Which type of Grey C.I. is most desirable? Why?	R	5	
	b)	Define Cast Iron.	R	5	
	c)	Write chemical composition of Gun metal. Write its applications.	A/R	6	
	d)	Define babitts. Write its types.	R	6	
	e)	Define brass. Write its types.	U/R	6	
	f)	Write chemical composition and properties of LM6 alloy.		6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw equilibrium diagram of Cu-Zn alloy system labeling important temperatures and phases.	U	6	
	b)	Explain modification of Al-Si alloys.	U	6	
	c)	Write properties of Grey Cast Iron.	U	5	
	d)	Explain pb-based bearing alloys.	U	6	
	e)	Write classification of Cast Iron with respect to microstructure.	R/U	5	
	f)	Explain in brief i) Phosphor bronze ii) Duralumin.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Differentiate between Gray Cast Iron and Nodular Cast Iron with respect to microstructure, properties and applications.	U/A	5	
	b)	Draw and explain Al-Si equilibrium diagram.	U	6	
	c)	Explain season cracking observed in brasses.	U	6	
	d)	Explain the requirements of good bearing metals.	A/U	6	
	e)	Describe Malleablizing treatment of white C.I.	U	5	
	f)	Explain in brief i) Orange peel effect ii) Effect of Cu-addition in Babbite.	U	6 6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **Fifth** PROGRAM : **Diploma in Metallurgical Engg.**

COURSE CODE :- **MTG 502 / MTF502**

COURSE NAME :- **Environmental Protection in Metallurgical Industries**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 09/06/2023

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SN	SECTION -I	R/U/	Co	Mar
Q.1		**Attempt any FOUR:**			08
	a)	What is environment pollution?	U	1	
	b)	Describe air pollution by foundries ?	R	2	
	c)	Give two recommendation to reduce air pollution	A	3	
	d)	What is noise pollution?	U	4	
	e)	Classification of pollution and pollutants	A	1	
	f)	Which process gases are evolved in hot rolling mill ?	R	3	
Q.2		**Attempt any FOUR:**			16
	a)	Elaborate : Amount of dust generated when finishing steel casting	R	2	
	b)	Write in detail general characteristic of harmful waste gases and dust involved in foundries?	U	2	
	c)	Comment on Non process gases and dust evolved in hot rolling mill	R	3	
	d)	Explain in detail about harmful substances evolved in pickling baths of pipe welding?	U	3	
	e)	Write a short note on harmful gases evolved in steel foundries?	R	2	
	f)	Explain the sources and effects of noise pollution on humans and environment	A	4	
Q.3		**Attempt any FOUR:**			16
	a)	Explain in detail about harmful substances when drying mould and cores in Iron foundries	R	2	
	b)	Discuss Industrial acts and its regulation	A	1	
	c)	Explain in detail noise pollution and provide 4 preventive measures to reduce the noise pollution	A	4	
	d)	Explain the process waste gases and dust in shops where the metals is fire trimmed ?	R	3	
	e)	Write the recommendations for reducing air pollution from foundries	U	2	
	f)	Explain in detail about harmful substances evolved in sheet rolling plants ?	U	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : METALLURGICAL ENGG

COURSE CODE: - MTG-502 / MTF502

COURSE NAME :- Environment protection in metallurgical Industries

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-09/06/2023

QN	SQN	SECTION –II	R/U/A	Co MTG 502	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Explain grid removal method.	A	6	
	b)	Define Radiation pollution.	A	8	
	c)	Define Environment audit.	A	9	
	d)	State the sources and effects of Radiation pollution.	R	8	
	e)	Define land filling of solid waste and draw diagram of land fill.	R	7	
	f)	Define thermal pollution.	A	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain phytoextraction.	R	7	
	b)	Explain 3R in short.	U	8	
	c)	Write a short note on final disposal of hazardous waste.	U	7	
	d)	Discuss the different stages of EIA.	U	9	
	e)	Explain disinfection method in waste water treatment.	U	6	
	f)	Write the benefits of environmental audit.	R	7	
Q.6		Attempt any **FOUR:**			**16**
	a)	Discuss in brief waste water treatment process.	U	6	
	b)	Write down the hazardous waste management.	R	7	
	c)	Explain activated sludge.	R	6	
	d)	Explain incineration method.	U	8	
	e)	Write a short note on effects of thermal pollution.	R	8	
	f)	Explain any one method of solid waste management.	U	8	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **MECHANICAL ENGINEERING**

COURSE CODE: **MEF312/CEF312/0227** COURSE NAME: **Non-conventional energy sources.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **07/06/2023**

Instruction :-

1) Answer must be written in main answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**-Question No, **SQN**-Sub-Question No, **R**- Remembering, **U**-Understanding, **A**-Application **CO**-Course outcome

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QN	SQN	QUESTION TEXT`	RUA	CO MEF 312	Marks
Q.1	A	Attempt any **FOUR**			**(08)**
	a)	Enlist four direct applications of solar energy.	R	01	
	b)	Define i) Solar Zenith angle ii) Declination angle	R	01	
	c)	Describe the term – Solar Radiation which instruments are used for measurement of solar radiation.	U	01	
	d)	Define power Co-efficient.	R	02	
	e)	Enlist the types of biomass conversion technologies.	R	03	
	f)	Explain the disadvantages of KVIC Digester plant.	U	03	
Q.2	A	Attempt any **FOUR**			**(16)**
	a)	Explain the need of alternate energy sources.	U	01	
	b)	Explain the working of solar pond with neat sketch.	U	01	
	c)	Draw a neat sketch of liquid flat plate collector & explain its working.	U	01	
	d)	Describe the factors for selection of site for wind mills.	R	02	
	e)	Explain the environmental aspects of wind energy.	A	02	
	f)	Explain with neat sketch the working of KVIC digester.	U	03	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Explain the advantages of concentrating collector over flat plate collector.	U	01	
	b)	State the principle of solar photo-voltaic electric conversion. How is it occured?	U	01	
	c)	Draw the neat sketch of domestic solar cooker. Explain its working.	U	01	
	d)	Explain the working of Horizontal axis wind mill turbine generator with neat sketch.	U	02	
	e)	Describe various power control mechanisms used in the generator.	A	02	
	f)	Describe the factors which affect the Biogas production.	R	03	

QN	SQN	QUESTION TEXT`	RUA	CO MEF 312	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Compare open cycle and closed cycle OTEC system.	U	04	
	b)	State the principle of Tidal power generation.	R	04	
	c)	Classify various geothermal energy sources.	U	04	
	d)	State two advantages and limitations of small scale hydroelectric plant.	R	04	
	e)	Define energy management.	R	05	
	f)	State the meaning of simple payback period and return on investment.	R	05	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Draw schematic of closed cycle OTEC power plant. Explain in short.	U	04	
	b)	Explain double basin arrangement of tidal power plant, with neat labeled sketch.	U	04	
	c)	Select type of turbine best suited for micro hydel plant. Explain it in brief.	U	04	
	d)	Draw schematic of open cycle MHD generators. State two advantages of MHD system.	U	04	
	e)	List and explain various components of small hydroelectric plant.	U	04	
	f)	Explain main components of fuel cell with neat sketch.	U	04	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Classify fuel cell. State its two advantages and applications.	U	04	
	b)	Distinguish between preliminary energy audit and detailed energy audit.	A	05	
	c)	Explain significance of energy conservation.	U	05	
	d)	Explain Sankey diagram and its use.	U/A	05	
	e)	Explain principle and methods of energy conservation.	U	05	
	f)	Relate cogeneration with energy conservation in industrial sector and elaborate.	U	05	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG305/MTF305**

COURSE NAME **FOUNDRY TECHNOLOGY-I**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **06/ 06 / 2023**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MTG 305	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Enlist different types of foundry.	R	1	
	b)	Define Pattern.	R	2	
	c)	State the role of core in mould making.	R	2	
	d)	Enlist the principle ingredients of foundry moulding sand.	R	3	
	e)	State the importance of foundry sand redaimation.	R	3	
	f)	Explain the term-Green Sand.	R	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Enlist various sections in foundry. Explain significance of each.	U	1	
	b)	Explain the role, advantages and limitations of thermocole as pattern material.	U	2	
	c)	With a neat labeled diagram, describe use of split pattern in molding.	U	2	
	d)	Mention different types of cores. Explain the preparation of 'No-bake' core.	U	3	
	e)	Explain the importance of clay in molding sand. Give examples of any two clay minerals.	U	3	
	f)	Describe the process of formation of 'silica gel' in $C0_2$ molding.	U	4	
Q.3		Attempt any **TWO:**			**16**
	a)	Give reason for providing allowances on patterns. Enlist different types of pattern allowances. Explain any two with neat diagrams.	U	2	
	b)	Explain in detail the procedure of determination of compressive strength of molding sand.	U	3	
	c)	Describe shell molding process with its ingredients, principle, steps in molding (with diagrams), advantages and applications.	U	4	

P.T.O

QN	SQN	QUESTION TEXT	RUA	CO MTG 305	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Write the advantages of Cupola furnace.	R	6	
	b)	State various casting cleaning and finishing operations.	R	7	
	c)	State suitable moulding process for casting manhole cover . Justify your selection.	R	4	
	d)	Write the principle of centrifugal casting.	R	4	
	e)	State the requirements of Wax as pattern materials.	R	5	
	f)	State advantages of permanent mould process.	R	4	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Explain the working of Cupola furnace.	RU	6	
	b)	Explain gravity die casting process.	RU	4	
	c)	Describe true centrifugal casting process with neat sketch.	RU	4	
	d)	Comment on pit & floor moulding.	U	5	
	e)	Discuss solid investment casting process.	U	5	
	f)	Differentiate between hot chamber & cold chamber die casting process.	RU	4	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Describe low pressure die casting process.	RU	4	
	b)	Explain continuous casting process.	U	6	
	c)	Explain i) Shot blasting ii) Sand blasting.	RU	8	
	d)	Suggest suitable casting process for the following components & justify. i) Gear box housing ii) Motor body.	A	7	
	e)	Draw a neat sketch of Cupola furnace & lebel all the parts.	RU	6	
	f)	State various types of Cupola furnace. Comment on hot blast cupola.	RU	6	

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG312**

COURSE NAME **EXTRACTION OF NON FERROUS METALS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **05/ 06 / 2023**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MTG 312	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define i) Flux ii) Slog.	R	1	
	b)	What is OFHC copper? Write its applications.	R	2	
	c)	State the steps in pyrometallurgical method of extraction.	R	1	
	d)	State ores of Titanium & write its sources.	R	3	
	e)	Write the properties of Lithium.	R	3	
	f)	Define blister copper.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain fire refining of copper.	U	2	
	b)	Explain advantages of hydrometallurgical methods of extraction.	A	1	
	c)	Describe Kroll's process used for extraction of it.	U	3	
	d)	Explain preparation of lithium by electrolysis.	U	3	
	e)	Define communication. Write its types.	U	1	
	f)	Comment on i) Current status of copper production in India. ii) Uses of lithium.	U	3	
Q.3		Attempt any **TWO:**			**16**
	a)	Describe with neat sketch conversion of matte into blister copper. Write chemical reactions occurring during this process.	U	2	
	b)	Define roasting. Write various types of roasting. Explain any one in detail.	U	1	
	c)	Explain Van Arkel's process for refining of titanium. Write ores of Lithium. Explain its applications.	U/A	3	

P.T.O

QN	SQN	Question Text	R/U/A	Co MTG 312	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write any four uses of zinc.	A	4	
	b)	Draw flowsheet for Bayer's process.	U	5	
	c)	Write the reactions involved in Cryolite preparation?	U	5	
	d)	State properties of Aluminium.	U	5	
	e)	Write applications (any four) of tungsten.	A	6	
	f)	State any four application of Aluminium.	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain fluidized bed roasting process to obtain zinc concentrate.	U	4	
	b)	Explain Bayer's process for extraction of Aluminum.	U	5	
	c)	Describe process for production of Tungsten powder.	U	6	
	d)	Describe the method for treatment of scheelite concentrate to obtain zinc.	U	4	
	e)	Explain construction and working of Aluminium reduction cell.	U	5	
	f)	With help of flow sheet explain hydrometallurgical process of zinc extraction.	A	4	
Q.6		Attempt any **TWO:**			**16**
	a)	State the properties of zinc. Explain refining of zinc by liquidation.	U	4	
	b)	Explain refining of Aluminium by electrolytic process. Write names of ores for Aluminium.	U	5	
	c)	Explain extraction of silver from its ore.	A	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **INFORMATION TECHNOLOGY**

COURSE CODE :- **ITG105**

COURSE NAME **COMPUTER PHERIPHERAL AND HARDWARE MAINTENANCE**

MAX. MARKS : **40** TIME : **02Hrs.** DATE :- **03/ 06 / 2023**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/ U/ A	Co ITG 105	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State difference between configurations of Desktop computer and Laptop.	U	1	
	b)	Define zone bit recording.	R	4	
	c)	State advantages of solid state drive.	U	4	
	d)	How to set password security to BIOS?	A	5	
	e)	List different levels of cache.	R	5	
	f)	Define Blackout and Brownout power problem.	R	6	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain proxy server.	R	1	
	b)	Describe working of opto-mechanical mouse.	U	2	
	c)	Explain laser printer with block diagram.	U	2	
	d)	Draw and explain layout of motherboard.	A	3	
	e)	Explain BIOS services.	U	5	
	f)	Describe working of online and offline UPS.	R	6	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain steps to troubleshoot printer.	A	2	
	b)	Compare LCD & LED monitors.	U	2	
	c)	Explain use of cache memory.	R	3	
	d)	Explain working of Hard disk drive.	U	4	
	e)	Describe multi-core processor architecture.	R	5	
	f)	Explain preventive maintenance of power supply.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG402** / MTF402

COURSE NAME **FOUNDRY TECHNOLOGY -II**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **03/ 06 / 2023**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	SECTION -I	R/U/A	Co MTG 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Raynould's no.	R	1	
	b)	Define modulus of casting.	R	2	
	c)	What is Mg recovery in S.G. Iron Casting?	U	2	
	d)	State the various furnaces used for melting steel.	R	1	
	e)	Define carbon equivalent.	R	2	
	f)	Define gating ratio. Write its types.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain Austempeed Ductile Iron (ADI)	U	3	
	b)	Describe the drill test used in production of Grey Cast iron Casting.	U	2	
	c)	State and explain Bernoulli's theorem. Write its significance.	R	1	
	d)	Explain the difference between the moulding and the casting of steel and cast iron.	U	3	
	e)	Explain Inscribed circle method of riser determination.	R	2	
	f)	Explain with neat sketches types of flakes in Grey Cast Iron. Justify which one is better.	R	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the steps in designing of gating system.	U	1	
	b)	Explain the difference between progressive solidification and directional solidification.	U	2	
	c)	Explain sand with method for production of S.G. Iron.	R	2	
	d)	Explain with neat sketches various types of S.G. Iron nodules.	R	2	
	e)	Comment on Warpoge in steel casting.	A	3	
	f)	Explain in brief. i) Chrorinov's rule ii) Vacuum degassing of steel.	U	1	

P.T.O.

QN	SQN	SECTION –II	R/U/A	Co MTG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write uses of Al-castings.	U	4	
	b)	Why Al-melt need degassing?	R	4	
	c)	State the appearance of blow hole in casting.	U	5	
	d)	State two properties & one use of copper alloy castings.	U	4	
	e)	State only reaction associate with dross forming tendency in copper.	R	4	
	f)	List various defect associate with discontinuity in casting.	U	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	What are post treatments carried on Al-melt?	U	4	
	b)	What precautions are necessary in Aluminum melting?	R	4	
	c)	Differentiate between slog inclusion and sand inclusion.	U	4	
	d)	Explain the machines used for pouring core making in foundries.	A	6	
	e)	Explain Gating design of copper castings.	U	4	
	f)	Explain causes and remedial action for Hot tear defect.	U	4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Write courses and Remedies of scab defect in castings.	U	5	
	b)	Explain causes and remedies of cold Shut.	R	5	
	c)	Explain energy saving in operating melting furnace.	A	6	
	d)	Comment of modernization in cast iron foundries.	A	6	
	e)	Explain High pressure moulding line.	A	6	
	f)	Comment on fluxing in Aluminium casting production.	A	4	

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QN	SQN	SECTION –II	R/U/A	Co MTG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write uses of Al-castings.	U	4	
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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG402** / MTF402

COURSE NAME **FOUNDRY TECHNOLOGY -II**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **03/ 06 / 2023**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	SECTION -I	R/U/A	Co MTG 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Raynould's no.	R	1	
	b)	Define modulus of casting.	R	2	
	c)	What is Mg recovery in S.G. Iron Casting?	U	2	
	d)	State the various furnaces used for melting steel.	R	1	
	e)	Define carbon equivalent.	R	2	
	f)	Define gating ratio. Write its types.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain Austermpeed Ductile Iron (ADI)	U	3	
	b)	Describe the drill test used in production of Grey Cast iron Casting.	U	2	
	c)	State and explain Bernoulli's theorem. Write its significance.	R	1	
	d)	Explain the difference between the moulding and the casting of steel and cast iron.	U	3	
	e)	Explain Inscribed circle method of riser determination.	R	2	
	f)	Explain with neat sketches types of flakes in Grey Cast Iron. Justify which one is better.	R	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the steps in designing of gating system.	U	1	
	b)	Explain the difference between progressive solidification and directional solidification.	U	2	
	c)	Explain sand with method for production of S.G. Iron.	R	2	
	d)	Explain with neat sketches various types of S.G. Iron nodules.	R	2	
	e)	Comment on Warpoge in steel casting.	A	3	
	f)	Explain in brief. i) Chrorinov's rule ii) Vacuum degassing of steel.	U	1	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGICAL ENGINEERING**

COURSE CODE :- **MTG310/MTF401**

COURSE NAME **METAL WORKING PROCESS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **02/ 06 / 2023**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MTG 310	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Classify metal forming process.	U	1	
	b)	Define ingot, billet, blooms and plates.	A	3	
	c)	Draw and define planetary rolling mill.	R	2	
	d)	Draw a neat sketch of stress-strain curve with all details.	A	1	
	e)	Define plastic deformation and strain hardening.	U	1	
	f)	Define neutral point & neutral plane.	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain soaking pits and continuous furnace for steel heating.	A	1	
	b)	Explain metallurgical changes occur after forming process.	U	1	
	c)	Explain two high and three high mills.	A	2	
	d)	Explain four defects with cause and prevention of rolled products.	R	2	
	e)	Explain the term sink drawing and tube drawing.	R	3	
	f)	Explain patenting heat treatment.	A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between hot and cold working of metals.	R	1	
	b)	Explain cluster and four high rolling mills.	U	2	
	c)	Differentiate between hot rolling and cold rolling.	U	2	
	d)	Explain drawing die.	A	3	
	e)	Explain draw bench.	R	3	
	f)	Explain rolling defects with cause and remedies any four.	R	2	

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QN	SQN	Question Text	R/U/A	Co MTG 310	**Marks**
Q.4		Attempt any **FOUR:**			**08**
	a)	State the term of forging with example.	R	4	
	b)	State extrusion with its type.	R	5	
	c)	List the parts made by sheet metal working.	U	6	
	d)	State Blanking with example.	U	6	
	e)	List different types of forging.	U	4	
	f)	Define Bending.	U	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	State and explain hydrostatic extrusion with application.	U	5	
	b)	List the types of extrusion and explain any one types of extrusion.	U	5	
	c)	List forging operation and explain upsetting and Fullering.	U	4	
	d)	Enlist and explain any two forging defects.	R	4	
	e)	Define deep drawing. Write its applications.	R	6	
	f)	Differentiate between hot forging and cold forging.	A	6	
Q.6		Attempt any **TWO:**			**16**
	a)	Explain with diagram, working Board of drop hammer.	U	4	
	b)	Differentiate between Direct and Indirect extrusion. Write variables in extrusion.	U	5	
	c)	Explain i) Shearing ii) Blanking iii) Trimming iv) Sharing.	U	6	

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : SIX PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG 406 / MTF406

COURSE NAME :- METAL JOINING AND FORMING PROCESSES

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 01 / 06 / 2023

QN	SQN	**SECTION –II**	R/U/A	CO MTG 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State different types of metal forming processes	R	8	
	b)	Define heat affected zone.	U	5	
	c)	State brazing and soldering applications.	A	7	
	d)	State the principal of powder forging process.	U	8	
	e)	State any two examples of soldering alloys	R	7	
	f)	State the principal of electrodischarge machining process	U	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe magnetic particle inspection method	R	7	
	b)	Differentiate between soldering and brazing	R	6	
	c)	Describe the process of cold forging process and its applications	U	8	
	d)	State advantages, disadvantages ans applications of EDM process	R	8	
	e)	Explain 1) corner joint 2)lap joint in welding in detail	U	5	
	f)	Explain 1) Weld crack 2) Hot tear their causes and remedies.	U	7	
Q.6		Attempt any **FOUR:**			**16**
	a)	State and explain types of flux used for soldering	U	6	
	b)	Explain electro chemical machining process	R	8	
	c)	Explain the effects of HAZ	R	5	
	d)	State and explain various post heat treatment of welding	U	5	
	e)	Explain the stepwise procedure of brazing	A	6	
	f)	Explain rockwell hardness test	U	7	

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - 4 PROGRAM: Diploma in Metallurgical Engineering

COURSE CODE: - MTG 406 / MTF406

COURSE NAME: - Metal joining & Special Forming Processes

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -01/06/ **23**

Instruction:-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**SECTION -I**	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Enlist various fabrication method. State two advantage of soldering as fabrication method.	U	1	2
	b)	Define term root side of weld & Weld bead.	R	2	2
	c)	Draw butt & lap joint.	A	2	2
	d)	State function or role of electrode in Electric Arc Welding.	A	3	2
	e)	State principle of resistance welding.	U	4	2
	f)	State two uses of resistance welding.	R	4	2
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain two basic requirements of soldering & brazing.	R	1	**4**
	b)	Write any two advantages, disadvantages & uses of reducing oxyacetylene flame.	A	2	4
	c)	Draw & explain oxy acetylene welding.	U	2	4
	d)	Explain advantages & disadvantages of gas welding.	R	2	4
	e)	Enlist fuel gas used in gas welding with molecular formula, Heat content & Flame temperature.	R	2	4
	f)	Draw and explain with neat sketch reducing oxy acetylene flame.	A	2	4
Q.3		Attempt any **FOUR:**			**16**
	a)	State welding defect found in Electric Arc Welding. State reason of difficulty in welding of magnetic material using Electric Arc Welding.	R	3	4
	b)	Explain principle and process of Metal Inert Gas (MIG) with diagram.	U	3	4
	c)	Write any four advantages and uses of Electric Arc Welding (EAW).	A	3	4
	d)	Define nugget with respect to resistance welding. Why it is called autogenous welding process.	U	4	4
	e)	Distinguish between spot & seam welding.	A	4	**4**
	f)	Explain with neat diagram principle of Thermitt welding.	A	4	**4**

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **METALLURGICAL ENGINEERING**

COURSE CODE: **MTG 306** COURSE NAME: **ELECTRICAL & ELECTRONICS ENGINEERING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **31/05 /2023**

Instruction -

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) QN-Question No, SQN-Sub-Question No, R- Remembering, U-Understanding, A-Application CO-Course outcome

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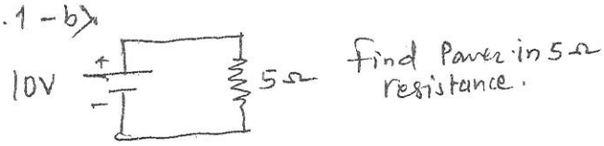
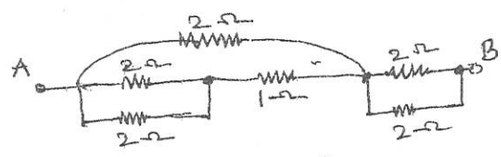
QN	SQ N	SECTION I	R U A	CO MTG 306	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Explain work power, energy for electrical network.	R	1	
	b)	Find power taken by DC Resistance of 5Ω network as shown in given circuit diagram with I/P 10 Vdc. (Diagram No.1)	A	1	
	c)	State the factors affecting resistance value.	R	1	
	d)	Define Fleming left hand rule.	R	3	
	e)	Explain Lagging & leading P.F. using vector diagram.	R	2	
	f)	State the necessity of earthing.	R	2	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain limitations of ohms law with suitable examples.	U	1	
	b)	Discuss active power using vector & waveform in an AC network.	U	2	
	c)	Describe with suitable diagrams an impedance triangle of vectors & with expressions.	U	2	
	d)	Comment on balanced & unbalanced load condition in a polyphase circuits.	U	2	
	e)	Explain with suitable diagrams principle of working of 3 phase induction motor.	U	3	
	f)	State applications of single phase induction motor of any type.	A	3	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Solve the given series & parallel combination of resistive network to find equivalent of resistance as shown in diagram No. 2	A	1	
	b)	Explain concept of resistance in electric circuit.	U	1	
	c)	Explain with suitable sketches & waveform concept of self inductance, inductive reactance, capacitance & capacitive reactance.	U	2	
	d)	Explain the R-L-C series circuit to find an expressions of power at 3 different conditions of $X_L > X_C$, $X_L < X_C$ & $X_L = X_C$.	A	2	
	e)	Explain principle of operation of single phase shaded pole induction motor with suitable diagrams.	U	3	
	f)	State typical applications of single phase induction motor according to their types.	A	3	

Dia ① Q.1 - b)



Dia ②



find R_{AB} = Ω.

QN	SQN	SECTION II	RUA	CO MTG 306	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Draw the symbol of following devices. i) P-N junction diode ii) BJT	R	4	
	b)	State the classification of measuring instrument.	R	5	
	c)	State any two advantages of measuring instruments.	R	5	
	d)	Define flow sensor.	R	5	
	e)	Correct $(ABCD)_H$ to decimal number.	A	6	
	f)	Explain OR Gate.	U	6	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Explain working of BJT in active mode.	U	4	
	b)	Explain Resistor and inductor w.r.t. i) Definition ii) Symbol iii) Unit iv) Application.	U	4	
	c)	Explain Displacement transducer in detail.	U	5	
	d)	Explain strain gauge in detail.	U	5	
	e)	Convert $(140)_{10} = (?)_2$ $(244)_{10} = (?)_2$	A	6	
	f)	Explain block diagram of electronics measuring system.	U	5	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Explain 7 segment display in detail.	U	4	
	b)	Explain construction & working of LED in detail.	U	4	
	c)	Explain different types of electrical transducers by giving one example of it.	U	5	
	d)	Explain one type of pressure transducer with neat diagram.	U	5	
	e)	Perform subtraction i) 11001 – 00111 , ii) 00101 – 01011	A	6	
	f)	Explain temperature sensor in detail.	U	5	

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: -IV PROGRAM: METALLURGICAL ENGG.

COURSE CODE: - MTG 404 / MTF404

COURSE NAME: - POWDER METALLURGY

MAX. MARKS: **80** TIME: **03 Hrs.** DATE :-30/05/2023

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**SECTION -I**	R/U/A	Co MTG 404	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write four applications of powder metallurgy.	R	1	
	b)	Give two advantages and two disadvantages of powder metallurgy.	U	1	
	c)	Enlist various machines/mills used for milling.	R	2	
	d)	Draw flow chart for production of Pyron iron powder.	R	2	
	e)	Define 'Green strength' and 'flow rate'.	R	3	
	f)	Define 'apparent density' and 'tap density'	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Define powder metallurgy. Compare Powder metallurgy with other metal shaping methods.	U	1	
	b)	Explain hall flow meter along with a neat diagram.	A	3	
	c)	With the help of flow chart explain production of Fe powder by thermal decomposition (carbonyl process).	U	2	
	d)	Describe Elutriation method for particle size measurement.	A	3	
	e)	Draw and explain water atomization for powder production.	U	2	
	f)	Give merits demerits of powder metallurgical process.	U	1	
Q.3		Attempt any **TWO**			**16**
	a)	a. List various forces acting on material being milled. b. Describe mechanism of milling process with a neat diagram of ball mill.	A	2	
	b)	Explain with neat diagram – a. Coning and quartering b. Scoop sampling c. Chute riffler d. Spinning riffler	A	3	
	c)	Explain condensation method. Give its advantages and disadvantages.	U	2	

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG404 / MTF 404

COURSE NAME: - POWDER METALLURGY

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -30/05/2023

QN	SQN	**SECTION –II**	R/U/A	Co MTG 404	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Enlist various powder compaction methods.	R	1	2
	b)	Define Hot isotactic compaction .Write it's any two applications.	R	2	2
	c)	Define Die compaction .List various die compaction methods.	R U	2	2
	d)	List various pressure less compaction method. Write any two advantages of slip casting.	U	2	2
	e)	Define Sintering .List various types of sintering.	R	5	2
	f)	Write applications of bearing materials.	A	6	2
Q.5		Attempt any **FOUR:**			**16**
	a)	State properties of sintered friction material.	U	6	4
	b)	Define Tool materials .Write its applications.	R A	5	4
	c)	Describe essential parts of a sintering furnace construction	U	5	4
	d)	Write characteristics required for binder in powder compaction.	U	4	4
	e)	With neat diagram explain cyclic compaction method.	U	4	4
	f)	Explain loose powder sintering method for compaction.	U	4	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain production of oil impregnation porous bearing materials.	U	6	4
	b)	Write prerequisites of sintering furnace.	U	5	4
	c)	Explain continuous furnace for sintering in powder metallurgy.	U	5	4
	d)	Describe steps in Powder rolling.	R	4	4
	e)	Describe mechanism of hot compaction.	U	4	4
	f)	Write four advantages of cold compaction.	A	4	4

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