GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : . FOURTH PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG 406/ MTF 406

COURSE NAME :- METAL JOINING AND FORMING PROCESSES

MAX. MARKS : 40 TIME : 1·30**Hrs** DATE :- 28/11/23

QN	SQN	**SECTION –II**	R/U/A	CO MTG 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any two examples of soldering alloys.	R	6	
	b)	State the principal of electrochemical machining.	U	8	
	c)	State the advantages of metal forging process.	U	8	
	d)	State the requirements of soldering alloys	U	6	
	e)	State different metal forming processes.	R	8	
	f)	Brazing has stronger bond than soldering. Explain	U	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	State and explain different types of powder forging processes.	U	8	
	b)	State any four welding defects.Explain their causes and remedies.	A	7	
	c)	Explain the electrodischarge machining process.	U	8	
	d)	Explain heat treatments after welding.	U	5	
	e)	Explain organic and inorganic fluxes used for soldering	U	6	
	f)	Explain ultrasonic testing	A	7	
Q.6		Attempt any **FOUR:**			**16**
	a)	State the advantages,disadvantages and applications of Electrochemical machining	A	8	
	b)	State differrent applications of welding process.	A	5	
	c)	Explain HAZ in detail with digram.	U	5	
	d)	Explain rockwell hardness test.	U	7	
	e)	State and explain different types of weld joints.	U	5	
	f)	State the functions of flux used for soldering .	R	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: Diploma in Metallurgical Engineering

COURSE CODE: - MTG406/MTF 406

COURSE NAME: - Metal Joining & Special Forming Processes

MAX. MARKS: 40 TIME: 1·30 **Hrs.** DATE: -28/11/**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 MTG 406	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define welding. State two advantages of welding over soldering.	U	1	2
	b)	Enlist various fuel gas used in gas welding in terms of chemical formula & trade name.	R	2	2
	c)	State function of welding torch.	U	2	2
	d)	State role of electrodes of Electric Arc Welding.	A	3	2
	e)	State name & Purpose of shield gas in MIG.	U	3	2
	f)	Enlist types of Resistance welding.	A	4	2
Q.2		Attempt any **FOUR:**			**16**
	a)	Distinguish between soldering & welding.	U	1	**4**
	b)	Draw neat and proportionate sketch of oxyacetylene welding setup. Labelled different parts.	U	2	4
	c)	Explain combustion chemistry of oxy acetylene gas welding.	R	2	4
	d)	Define fusion welding. List various zones seen in fusion welding.	R	3	4
	e)	Explain production of reducing flame in oxy acetylene welding. State two advantages.	U	3	4
	f)	Enlist various weld defects. Explain any one in term of causes & remedial action.	R	3	4
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain principle for arc generation. State formula of minimum voltage required to sustain arc.	U	4	4
	b)	Explain various coating materials of electrode with function.	R	4	4
	c)	Explain TIG in term of procedure & uses.	A	4	4
	d)	Explain electrodes of spot welding in term of requirement & composition.	R	5	4
	e)	Explain procedure of Thermitt welding.	U	5	**4**
	f)	Explain principle and any two uses of Electron beam welding process.	R	5	**4**

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : FOURTH PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG 406/ MTF 406

COURSE NAME :- METAL JOINING AND FORMING PROCESSES

MAX. MARKS : 40 TIME : 1·30**Hrs** DATE :- 28/11/23

QN	SQN	SECTION –II	R/U/A	CO MTG 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any two examples of soldering alloys.	R	6	
	b)	State the principal of electrochemical machining.	U	8	
	c)	State the advantages of metal forging process.	U	8	
	d)	State the requirements of soldering alloys	U	6	
	e)	State different metal forming processes.	R	8	
	f)	Brazing has stronger bond than soldering. Explain	U	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	State and explain different types of powder forging processes.	U	8	
	b)	State any four welding defects.Explain their causes and remedies.	A	7	
	c)	Explain the electrodischarge machining process.	U	8	
	d)	Explain heat treatments after welding.	U	5	
	e)	Explain organic and inorganic fluxes used for soldering	U	6	
	f)	Explain ultrasonic testing	A	7	
Q.6		Attempt any **FOUR:**			**16**
	a)	State the advantages,disadvantages and applications of Electrochemical machining	A	8	
	b)	State differrent applications of welding process.	A	5	
	c)	Explain HAZ in detail with digram.	U	5	
	d)	Explain rockwell hardness test.	U	7	
	e)	State and explain different types of weld joints.	U	5	
	f)	State the functions of flux used for soldering .	R	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: Diploma in Metallurgical Engineering

COURSE CODE: - MTG406/MTF 406

COURSE NAME: - Metal Joining & Special Forming Processes

MAX. MARKS: 40 TIME: 1·30 **Hrs.** DATE: -28/11/**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 MTG 406	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define welding. State two advantages of welding over soldering.	U	1	2
	b)	Enlist various fuel gas used in gas welding in terms of chemical formula & trade name.	R	2	2
	c)	State function of welding torch.	U	2	2
	d)	State role of electrodes of Electric Arc Welding.	A	3	2
	e)	State name & Purpose of shield gas in MIG.	U	3	2
	f)	Enlist types of Resistance welding.	A	4	2
Q.2		Attempt any **FOUR:**			**16**
	a)	Distinguish between soldering & welding.	U	1	**4**
	b)	Draw neat and proportionate sketch of oxyacetylene welding setup. Labelled different parts.	U	2	4
	c)	Explain combustion chemistry of oxy acetylene gas welding.	R	2	4
	d)	Define fusion welding. List various zones seen in fusion welding.	R	3	4
	e)	Explain production of reducing flame in oxy acetylene welding. State two advantages.	U	3	4
	f)	Enlist various weld defects. Explain any one in term of causes & remedial action.	R	3	4
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain principle for arc generation. State formula of minimum voltage required to sustain arc.	U	4	4
	b)	Explain various coating materials of electrode with function.	R	4	4
	c)	Explain TIG in term of procedure & uses.	A	4	4
	d)	Explain electrodes of spot welding in term of requirement & composition.	R	5	4
	e)	Explain procedure of Thermitt welding.	U	5	**4**
	f)	Explain principle and any two uses of Electron beam welding process.	R	5	**4**

P.T.O

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG310**

COURSE NAME **METAL WORKING PROCESSES**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **28/ 11 / 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)	Give examples of four metal forming processes.	R	1	
	b)	Define Recrystallization temperature of metals.	R	1	
	c)	Define Rolling of metals.	R	2	
	d)	State the significance of roll bite condition.	U	2	
	e)	Enlist the size ranges of starting materials for wire drawing.	U	3	
	f)	State the principle of wire drawing process.	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Suggest a suitable forming process to manufacture 1" diameter copper tube. Enlist the steps in manufacturing.	A	1	
	b)	Differentiate between cold working and hot working of metals with respect to the process, temperature change in properties and grain size/shape and applications.	U	1	
	c)	Explain the working of 'planetary mill' with a neat diagram.	R	2	
	d)	Explain the working of a four high rolling with a neat labeled diagram.	U	2	
	e)	Write classification of rolling mill based on roll stand design.	A	2	
	f)	Explain the heat treatment cycle of patenting. State the changes obtained in the microstructure after patenting.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw a neat labeled diagram of a wire drawing die and explain various zones of the die.	U	3	
	b)	Define mean scale on wire. Explain any one method for its cleaning.	U	3	
	c)	State the needs for lubrication during wire drawing. Enlist the materials used as lubricants in wire drawing process.	U	3	
	d)	Derive the expression for maximum reduction in rolling.	U	2	
	e)	Explain the relationship between coefficient of friction, rolling load and torque during rolling.	U	2	
	f)	Describe preheating of steels in soaking pits, for hot working.	U	1	

P.T.O

QN	SQN	QUESTION TEXT	RUA	CO MTG 310	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Enlist various machine forging process. ;	A	4	
	b)	Define upsetting and Spreading operation.	R	4	
	c)	Enlist various temperatures used in forging for different metals.	U	4	
	d)	Enlist various materials used for forging dies.	A	4	
	e)	Enlist applications of extrusion.	A	5	
	f)	Enlist applications of sheet metal working.	A	6	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Explain single action air / stream hammer.	U	4	
	b)	Explain hydraulic hammer forging.	U	4	
	c)	Differentiate between direct & indirect extrusion.	R	5	
	d)	Explain impact extrusion.	R	5	
	e)	Enlist various applications & advantages of sheet metal working.	A	6	
	f)	Explain spring back effect of sheet metal working.	R	6	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Explain spring hammer for forging.	R	4	
	b)	Explain any two hand forging tools.	U	4	
	c)	Explain indirect extrusion process.	R	5	
	d)	Explain any two defects with cause & prevention of extrusion.	A	5	
	e)	Explain any two sheet metal working process.	A	6	
	f)	Explain bending operation in sheet metal working with clearance between die & punch.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG310**

COURSE NAME **METAL WORKING PROCESSES**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **28/ 11 / 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)	Give examples of four metal forming processes.	R	1	
	b)	Define Recrystallization temperature of metals.	R	1	
	c)	Define Rolling of metals.	R	2	
	d)	State the significance of roll bite condition.	U	2	
	e)	Enlist the size ranges of starting materials for wire drawing.	U	3	
	f)	State the principle of wire drawing process.	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Suggest a suitable forming process to manufacture 1" diameter copper tube. Enlist the steps in manufacturing.	A	1	
	b)	Differentiate between cold working and hot working of metals with respect to the process, temperature change in properties and grain size/shape and applications.	U	1	
	c)	Explain the working of 'planetary mill' with a neat diagram.	R	2	
	d)	Explain the working of a four high rolling with a neat labeled diagram.	U	2	
	e)	Write classification of rolling mill based on roll stand design.	A	2	
	f)	Explain the heat treatment cycle of patenting. State the changes obtained in the microstructure after patenting.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw a neat labeled diagram of a wire drawing die and explain various zones of the die.	U	3	
	b)	Define mean scale on wire. Explain any one method for its cleaning.	U	3	
	c)	State the needs for lubrication during wire drawing. Enlist the materials used as lubricants in wire drawing process.	U	3	
	d)	Derive the expression for maximum reduction in rolling.	U	2	
	e)	Explain the relationship between coefficient of friction, rolling load and torque during rolling.	U	2	
	f)	Describe preheating of steels in soaking pits, for hot working.	U	1	

P.T.O

QN	SQN	QUESTION TEXT	RUA	CO MTG 310	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Enlist various machine forging process. ;	A	4	
	b)	Define upsetting and Spreading operation.	R	4	
	c)	Enlist various temperatures used in forging for different metals.	U	4	
	d)	Enlist various materials used for forging dies.	A	4	
	e)	Enlist applications of extrusion.	A	5	
	f)	Enlist applications of sheet metal working.	A	6	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Explain single action air / stream hammer.	U	4	
	b)	Explain hydraulic hammer forging.	U	4	
	c)	Differentiate between direct & indirect extrusion.	R	5	
	d)	Explain impact extrusion.	R	5	
	e)	Enlist various applications & advantages of sheet metal working.	A	6	
	f)	Explain spring back effect of sheet metal working.	R	6	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Explain spring hammer for forging.	R	4	
	b)	Explain any two hand forging tools.	U	4	
	c)	Explain indirect extrusion process.	R	5	
	d)	Explain any two defects with cause & prevention of extrusion.	A	5	
	e)	Explain any two sheet metal working process.	A	6	
	f)	Explain bending operation in sheet metal working with clearance between die & punch.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG303**

COURSE NAME **METALLURGICAL ANALISIS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **29/ 11 / 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 SECTION-I	R/U/A	Co MTG 303	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define 'Qualitative Analysis'.	R	1	
	b)	Mention the range of pH for acid base and neutral solution.	A	2	
	c)	Enlist steps involved in 'Gravimetric Analysis'.	U	2	
	d)	State names and their roles of any two equipments used in chemical laboratory.	U	1	
	e)	Enlist types of errors in chemical analysis.	R	1	
	f)	State 'Salt effect'.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Elaborate on 'Types of sampling methods'.	U	1	
	b)	Write the precautions to be taken while handling analytical balance.	U	1	
	c)	Compare qualitative analysis with quantitative analysis.	U	1	
	d)	Differentiate between – Classical methods of analysis and instrumental methods of analysis.	U	1	
	e)	Enlist advantages and disadvantages of gravimetric analysis.	R	2	
	f)	Describe requirements of precipitate.	A	2	
Q.3		Attempt any **TWO:**			**16**
	a)	In an experiment, the observer got following readings (in gm) 5,6,8,12. Calculate i) Deviation for each value ii) Mean iii) Mean deviation and iv) Relative mean deviation.	A	1	
	b)	Calculate pH of a solution having i) $[H^+] = 10^{-8}$ ii) $P^{OH} = 8$ iii) $[OH^-] = 10^{-4}$ iv) $[H^+] = 10^{-4}$.	A	3	
	c)	Write a detailed note on 'steps to perform Gravimetric analysis'.	U	2	

P.T.O

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - THREE PROGRAM : METALLURGY (FOUNDRY)

COURSE CODE :-MTG303

COURSE NAME :- METALLURGICAL ANALYSIS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-29/11/23

QN	SQN	SECTION –II	R/U/A	Co MTG 303	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State different advanced instruments used for analysis		4	
	b)	State Beer's law		4	
	c)	Define standard solution		3	
	d)	Define colorimetry		4	
	e)	State the types of spectroscopy		4	
	f)	What is the pH range of acid base and neutral solution.		3	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw and explain titration curve for strong acid and strong base?		3	
	b)	Explain advantages and disadvantages of volumetric analysis?		3	
	c)	State the procedure to determine Mg level in SG Iron.		5	
	d)	Explain the procedure for volumetric analysis of manganese in iron.		5	
	e)	Explain working of vacuum emission spectrometer		4	
	f)	Explain different precautions to be taken in chemical laboratory?		4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Write a short note on standard solution.		3	
	b)	Explain redox titration?		3	
	c)	Enlist different instruments used in metallurgical analysis		4	
	d)	State the role of indicators?Give two examples of indicator?		3	
	e)	Explain the electrogravimetric analysis of Cu		4	
	f)	Explain the process suitable for determination of silicon from ferrosilicon		5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG303**

COURSE NAME **METALLURGICAL ANALISIS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **29/ 11 / 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.
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7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text SECTION-I	R/U/A	Co MTG 303	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define 'Qualitative Analysis'.	R	1	
	b)	Mention the range of pH for acid base and neutral solution.	A	2	
	c)	Enlist steps involved in 'Gravimetric Analysis'.	U	2	
	d)	State names and their roles of any two equipments used in chemical laboratory.	U	1	
	e)	Enlist types of errors in chemical analysis.	R	1	
	f)	State 'Salt effect'.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Elaborate on 'Types of sampling methods'.	U	1	
	b)	Write the precautions to be taken while handling analytical balance.	U	1	
	c)	Compare qualitative analysis with quantitative analysis.	U	1	
	d)	Differentiate between – Classical methods of analysis and instrumental methods of analysis.	U	1	
	e)	Enlist advantages and disadvantages of gravimetric analysis.	R	2	
	f)	Describe requirements of precipitate.	A	2	
Q.3		Attempt any **TWO:**			**16**
	a)	In an experiment, the observer got following readings (in gm) 5,6,8,12. Calculate i) Deviation for each value ii) Mean iii) Mean deviation and iv) Relative mean deviation.	A	1	
	b)	Calculate pH of a solution having i) $[H^+] = 10^{-8}$ ii) $P^{OH} = 8$ iii) $[OH^-] = 10^{-4}$ iv) $[H^+] = 10^{-4}$.	A	3	
	c)	Write a detailed note on 'steps to perform Gravimetric analysis'.	U	2	

P.T.O

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - THREE PROGRAM : METALLURGY (FOUNDRY)

COURSE CODE :-MTG303

COURSE NAME :- METALLURGICAL ANALYSIS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-29/11/23

QN	SQN	SECTION –II	R/U/A	Co MTG 303	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State different advanced instruments used for analysis		4	
	b)	State Beer's law		4	
	c)	Define standard solution		3	
	d)	Define colorimetry		4	
	e)	State the types of spectroscopy		4	
	f)	What is the pH range of acid base and neutral solution.		3	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw and explain titration curve for strong acid and strong base?		3	
	b)	Explain advantages and disadvantages of volumetric analysis?		3	
	c)	State the procedure to determine Mg level in SG Iron.		5	
	d)	Explain the procedure for volumetric analysis of manganese in iron.		5	
	e)	Explain working of vacuum emission spectrometer		4	
	f)	Explain different precautions to be taken in chemical laboratory?		4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Write a short note on standard solution.		3	
	b)	Explain redox titration?		3	
	c)	Enlist different instruments used in metallurgical analysis		4	
	d)	State the role of indicators?Give two examples of indicator?		3	
	e)	Explain the electrogravimetric analysis of Cu		4	
	f)	Explain the process suitable for determination of silicon from ferrosilicon		5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG 401

COURSE NAME :- Physical Metallurgy -II

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-~~29~~ /11 / **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	MTG 401	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write the significance of Ms and Mf temperatures.	R	1	
	b)	Draw neat sketch of TTT diagram and lebel it.	R	1	
	c)	State the difference in cooling rate of annealing and normalizing.	U	2	
	d)	Write the objective of full hardening.	R	3	
	e)	State the mechanism of secondary hardening.	R	4	
	f)	Write the importance of heating rate in heat treatment.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the effect of cooling rate on the properties and microstructure of steels..	U	2	
	b)	State the characteristics of martensitic transformation.	U	1	
	c)	Describe spherodizing annealing.	U	2	
	d)	Write the precautions and care to be taken in hardening.	R	3	
	e)	Comment on effect of tempering temperatures on the mechanical properties of steels.	A	4	
	f)	Explain temper embrittlement.	U	4	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the types of tempering. Explain the microstructural changes occur with temperatures.	A	4	
	b)	Describe 3 stage of quenching.	U	3	
	c)	Differentiate between normalizing and annealing.	U	2	
	d)	Draw T T T diagram for eutectoid steel and explain.	R	2	
	e)	Explain the mechanism of pearlite transformation.	U	1	
	f)	Explain the importance of austenite grain size.	U	1	

P.T.O.

QN	SQN	SECTION –II	R/U/A	Co MTG 401	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Name the method used for determination of hardenability.	A	5	
	b)	Define Hardenability.	R	5	
	c)	Write various surface hardening methods.	R	6	
	d)	State two advantages of Induction hardening.	A	7	
	e)	Define Flame hardening.	R	7	
	f)	List various heat treatments given to grey cast iron.	U R	7	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain procedure to determine hardenability by Jominy End Quench test.	U	5	
	b)	Explain progressive and spinning flame hardening methods.	U	6	
	c)	Explain principle and process of Pack carburising.	R	6	
	d)	Write purpose of stress relieving in Gray Cast Iron.	U	7	
	e)	State the conditions required for precipitation hardening to take place in an alloy.	U	8	
	f)	Explain Annealing heat treatment of Aluminium alloy.	R	8	
Q.6		Attempt any **FOUR:**			**16**
	a)	State the factors affecting hardenability.	A	5	
	b)	Explain process of carbonitriding surface hardening treatment.	U	6	
	c)	Explain Gas carburising surface hardening method.	U	6	
	d)	State advantages and disadvantages of flame hardening.	A	6	
	e)	List various heat treatments done on Mg-alloys. Explain any one.	U/R	8	
	f)	State role of various safety equipments in heat treatment shop.	R	9	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - IV

PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG 401

COURSE NAME :- Physical Metallurgy -II

MAX. MARKS : **80** TIME : **03 Hrs** DATE :~~29~~ /11 / **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	MTG 401	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write the significance of Ms and Mf temperatures.	R	1	
	b)	Draw neat sketch of TTT diagram and lebel it.	R	1	
	c)	State the difference in cooling rate of annealing and normalizing.	U	2	
	d)	Write the objective of full hardening.	R	3	
	e)	State the mechanism of secondary hardening.	R	4	
	f)	Write the importance of heating rate in heat treatment.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the effect of cooling rate on the properties and microstructure of steels..	U	2	
	b)	State the characteristics of martensitic transformation.	U	1	
	c)	Describe spherodizing annealing.	U	2	
	d)	Write the precautions and care to be taken in hardening.	R	3	
	e)	Comment on effect of tempering temperatures on the mechanical properties of steels.	A	4	
	f)	Explain temper embrittlement.	U	4	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the types of tempering. Explain the microstructural changes occur with temperatures.	A	4	
	b)	Describe 3 stage of quenching.	U	3	
	c)	Differentiate between normalizing and annealing.	U	2	
	d)	Draw T T T diagram for eutectoid steel and explain.	R	2	
	e)	Explain the mechanism of pearlite transformation.	U	1	
	f)	Explain the importance of austenite grain size.	U	1	

P.T.O.

QN	SQN	SECTION –II	R/U/A	Co MTG 401	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Name the method used for determination of hardenability.	A	5	
	b)	Define Hardenability.	R	5	
	c)	Write various surface hardening methods.	R	6	
	d)	State two advantages of Induction hardening.	A	7	
	e)	Define Flame hardening.	R	7	
	f)	List various heat treatments given to grey cast iron.	U R	7	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain procedure to determine hardenability by Jominy End Quench test.	U	5	
	b)	Explain progressive and spinning flame hardening methods.	U	6	
	c)	Explain principle and process of Pack carburising.	R	6	
	d)	Write purpose of stress relieving in Gray Cast Iron.	U	7	
	e)	State the conditions required for precipitation hardening to take place in an alloy.	U	8	
	f)	Explain Annealing heat treatment of Aluminium alloy.	R	8	
Q.6		Attempt any **FOUR:**			**16**
	a)	State the factors affecting hardenability.	A	5	
	b)	Explain process of carbonitriding surface hardening treatment.	U	6	
	c)	Explain Gas carburising surface hardening method.	U	6	
	d)	State advantages and disadvantages of flame hardening.	A	6	
	e)	List various heat treatments done on Mg-alloys. Explain any one.	U/R	8	
	f)	State role of various safety equipments in heat treatment shop.	R	9	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 202

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : METALLURGICAL ENGG.

COURSE CODE :- MTG312

COURSE NAME :- EXTRACTION OF NON - FERROUS METALS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 01/12/23

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		R/U/A	Co MTG 312-	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define comminution of ore.	R	MTG 312-1	
	b)	Define leaching.	R	MTG 312-2	
	c)	Enlist 4 main steps in pyro-metallurgy of copper	R	MTG 312-2	
	d)	What is smelting of copper ore?	U	MTG 312-2	
	e)	Give 2 ores of titanium and lithium each.	R	MTG 312-3	
	f)	Give 2 reasons why extraction of titanium is expensive?	U	MTG 312-3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw a neat diagram of froth flotation method for extraction of copper.	R	MTG 312-2	
	b)	Give detailed flowsheet of extraction of copper by pyrometallurgical route	U	MTG 312-2	
	c)	Write principles of following - A. Jigging B. Magnetic separation C. Tabling. D. Electrostatic separation	U	MTG 312-1	
	d)	Draw flow chart of production of titanium tetrachloride from ilmenite.	R	MTG 312-3	
	e)	Explain halogenation of ilmenite.	U	MTG 312-3	
	f)	Draw neat diagram of cone crusher and explain its working.	R	MTG 312-1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw and explain gyratory crusher.	R/U	MTG 312-1	
	b)	Enlist methods of leaching copper ore explain any one.	R	MTG 312-2	
	c)	Explain electrolytic refining of copper ore.	U	MTG 312-2	
	d)	Explain electric smelting of ilmenite.	U	MTG 312-3	
	e)	Describe magnetic separation method with neat diagram.	U	MTG 312-1	
	f)	Draw a neat diagram of electrolysis process of lithium chloride.	R	MTG 312-3	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 312	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State ores of Silver and Gold.	R	6	
	b)	State any two properties and applications of zinc.	R	4	
	c)	Define Cryolite. Write its sources.	R	5	
	d)	Write any two advantages of cynding ; of Gold and Silver.	R	6	
	e)	State the ores of tungsten. Write its applications.	R	6	
	f)	Write the current status of Zn production in India.	A	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain roasting of Zn ores.	U	4	
	b)	Explain with neat sketch working of aluminimum reduction cell.	U	5	
	c)	Describe refining of silver.	U	6	
	d)	Draw flow sheet of Bayer's process.	U	5	
	e)	Describe horizontal retort process of Zn extractions.	U	4	
	f)	Explain reduction of tungsten in presence of carbon.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe the process of alumina preparation.	U	5	
	b)	Explain extraction of Zn by pyrometallurgy.	U	4	
	c)	Explain cynidation of Gold.	U	6	
	d)	Describe manufacture of ductile tungsten.	A	6	
	e)	State types of refining Zn. Explain any one	U	4	
	f)	State the use of carbon electrodes for aluminium extraction. Write the process for its preparation.	A	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 202

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : METALLURGICAL ENGG.

COURSE CODE :- MTG312

COURSE NAME :- EXTRACTION OF NON - FERROUS METALS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 01/12/23

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		R/U/A	Co MTG 312	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define comminution of ore.	R	MTG 312-1	
	b)	Define leaching.	R	MTG 312-2	
	c)	Enlist 4 main steps in pyro-metallurgy of copper	R	MTG 312-2	
	d)	What is smelting of copper ore?	U	MTG 312-2	
	e)	Give 2 ores of titanium and lithium each.	R	MTG 312-3	
	f)	Give 2 reasons why extraction of titanium is expensive?	U	MTG 312-3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw a neat diagram of froth flotation method for extraction of copper.	R	MTG 312-2	
	b)	Give detailed flowsheet of extraction of copper by pyrometallurgical route	U	MTG 312-2	
	c)	Write principles of following - A. Jigging B. Magnetic separation C. Tabling. D. Electrostatic separation	U	MTG 312-1	
	d)	Draw flow chart of production of titanium tetrachloride from ilmenite.	R	MTG 312-3	
	e)	Explain halogenation of ilmenite.	U	MTG 312-3	
	f)	Draw neat diagram of cone crusher and explain its working.	R	MTG 312-1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw and explain gyratory crusher.	R/U	MTG 312-1	
	b)	Enlist methods of leaching copper ore explain any one.	R	MTG 312-2	
	c)	Explain electrolytic refining of copper ore.	U	MTG 312-2	
	d)	Explain electric smelting of ilmenite.	U	MTG 312-3	
	e)	Describe magnetic separation method with neat diagram.	U	MTG 312-1	
	f)	Draw a neat diagram of electrolysis process of lithium chloride.	R	MTG 312-3	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 312	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State ores of Silver and Gold.	R	6	
	b)	State any two properties and applications of zinc.	R	4	
	c)	Define Cryolite. Write its sources.	R	5	
	d)	Write any two advantages of cyniding of Gold and Silver.	R	6	
	e)	State the ores of tungsten. Write its applications.	R	6	
	f)	Write the current status of Zn production in India.	A	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain roasting of Zn ores.	U	4	
	b)	Explain with neat sketch working of aluminimum reduction cell.	U	5	
	c)	Describe refining of silver.	U	6	
	d)	Draw flow sheet of Bayer's process.	U	5	
	e)	Describe horizontal retort process of Zn extractions.	U	4	
	f)	Explain reduction of tungsten in presence of carbon.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe the process of alumina preparation.	U	5	
	b)	Explain extraction of Zn by pyrometallurgy.	U	4	
	c)	Explain cynidation of Gold.	U	6	
	d)	Describe manufacture of ductile tungsten.	A	6	
	e)	State types of refining Zn. Explain any one	U	4	
	f)	State the use of carbon electrodes for aluminium extraction. Write the process for its preparation.	A	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : **Metallurgy**

COURSE CODE :- MTG308

COURSE NAME :- Mechanical enginnering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-01/12/23

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		R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What are the differences between 1st and 3rd angle of projection?	R	1	
	b)	Write classification of I.C engines.	R	3	
	c)	What are the different modes of heat transfer?	U	4	
	d)	Write any two application of heat transfer related to metallurgy field	R	4	
	e)	Write Fourier law of Heat conduction.	R	4	
	f)	Give four strokes in IC engine	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw conventional representation of 1) Partial view ii) Removed Section	R	2	
	b)	Draw sectional front orthographic view of crankshaft.	R	1	
	c)	Draw orthographic views pump body.	R	1	
	d)	Explain working of Four stroke engine with neat sketch.	U	3	
	e)	A surface having an area of 1.5 m^2 and maintained at 300^{0}C exchanges heat by radiation with another surface at 40^{0}C. The value of factor due to the geometric location and emissivity is 0.52. Determine: i) Heat lost by radiation ii) The value of equivalent convective coefficient.	A	4	
	f)	Differentiate between SI and CI engine	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the concept of black body with neat sketch.	R	4	
	b)	Draw sectional front orthographic view of Flanged coupling.	R	1	
	c)	State the function and materials used for the following components i)Piston ii) valves iii) Cylinder iv) spark plug	U	3	
	d)	Explain working of Two stroke petrol engine with neat sketch.	U	3	
	e)	Explain types of insulation used in industries	U	4	
	f)	Draw different sections of Gear.	R	2	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : Metallurgical Engineering

COURSE CODE :- MTG 308

COURSE NAME :- Mechanical Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 01/12/23

QN	SQN		R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define pumps	R	MTG 308- 7	
	b)	Define surface tension	R	MTG 308- 5	
	c)	List various types of belts used for transmission of power	R	MTG 308- 6	
	d)	State SI unit of :- I) Mass density II) Specific Weight	U	MTG 308- 5	
	e)	Define rope drive	R	MTG 308- 6	
	f)	Define pneumatic system	R	MTG 308- 8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw a neat sketch of hydraulic power pack	R	MTG 308- 8	
	b)	Explain chain drive with neat sketch	U	MTG 308- 6	
	c)	Expalin the term i) compresibility ii) Vapour pressure	U	MTG 308- 5	
	d)	Define viscosity. What are the types of it? And what is the effect of temperature on viscosity of liquids.	R	MTG 308- 5	
	e)	Explain reciprocating pump	U	MTG 308- 7	
	f)	Draw the convection representation of i) Flow control valve ii) 5/2 DC valve	R	MTG 308- 8	
Q.6		Attempt any TWO			**16**
	a)	Describe meter in and meter out circuit	U	MTG 308- 8	
	b)	Explain with neat sketch construction & working of centrifugal compressor	U	MTG 308- 7	
	c)	Recommend drives for following:- i) Lathe ii) washing machine ii) Elevator iv) Flour mill	A	MTG 308- 6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : **Metallurgy**

COURSE CODE :- MTG308

COURSE NAME :- Mechanical enginnering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-01/12/23

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		R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What are the differences between 1st and 3rd angle of projection?	R	1	
	b)	Write classification of I.C engines.	R	3	
	c)	What are the different modes of heat transfer?	U	4	
	d)	Write any two application of heat transfer related to metallurgy field	R	4	
	e)	Write Fourier law of Heat conduction.	R	4	
	f)	Give four strokes in IC engine	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw conventional representation of 1) Partial view ii) Removed Section	R	2	
	b)	Draw sectional front orthographic view of crankshaft.	R	1	
	c)	Draw orthographic views pump body.	R	1	
	d)	Explain working of Four stroke engine with neat sketch.	U	3	
	e)	A surface having an area of 1.5 m^2 and maintained at 300^{0}C exchanges heat by radiation with another surface at 40^{0}C. The value of factor due to the geometric location and emissivity is 0.52. Determine: i) Heat lost by radiation ii) The value of equivalent convective coefficient.	A	4	
	f)	Differentiate between SI and CI engine	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the concept of black body with neat sketch.	R	4	
	b)	Draw sectional front orthographic view of Flanged coupling.	R	1	
	c)	State the function and materials used for the following components i)Piston ii) valves iii) Cylinder iv) spark plug	U	3	
	d)	Explain working of Two stroke petrol engine with neat sketch.	U	3	
	e)	Explain types of insulation used in industries	U	4	
	f)	Draw different sections of Gear.	R	2	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : Metallurgical Engineering

COURSE CODE :- MTG 308

COURSE NAME :- Mechanical Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 01/12/23

QN	SQN		R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define pumps	R	MTG 308- 7	
	b)	Define surface tension	R	MTG 308- 5	
	c)	List various types of belts used for transmission of power	R	MTG 308- 6	
	d)	State SI unit of :- I) Mass density II) Specific Weight	U	MTG 308- 5	
	e)	Define rope drive	R	MTG 308- 6	
	f)	Define pneumatic system	R	MTG 308- 8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw a neat sketch of hydraulic power pack	R	MTG 308- 8	
	b)	Explain chain drive with neat sketch	U	MTG 308- 6	
	c)	Expalin the term i) compresibility ii) Vapour pressure	U	MTG 308- 5	
	d)	Define viscosity. What are the types of it? And what is the effect of temperature on viscosity of liquids.	R	MTG 308- 5	
	e)	Explain reciprocating pump	U	MTG 308- 7	
	f)	Draw the convection representation of i) Flow control valve ii) 5/2 DC valve	R	MTG 308- 8	
Q.6		Attempt any TWO			**16**
	a)	Describe meter in and meter out circuit	U	MTG 308- 8	
	b)	Explain with neat sketch construction & working of centrifugal compressor	U	MTG 308- 7	
	c)	Recommend drives for following:- i) Lathe ii) washing machine ii) Elevator iv) Flour mill	A	MTG 308- 6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM :Diploma in Metallurgical Engineering

COURSE CODE :- MTG 403

COURSE NAME :- Failure Analysis and selection of Materials

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/12/ **23**

QN	SQN	SECTION –I	R/U/A	Co MTG 403	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Why ductile fracture is less risky than brittle fracture?	U	2	
	b)	Write the types of NDT methods.	R	4	
	c)	Define erosion.	R	4	
	d)	What should be the content of failure analysis report.	R	1	
	e)	Write the two causes of intercrystalline brittle fracture.	R	2	
	f)	State the categories of stressors.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write the types of wear. Explain any one in detail.	U	4	
	b)	Differentiate between stress raisers and strength reducers.	U	2	
	c)	Explain the steps in the investigation of failure.	R	1	
	d)	Discuss the factors that influence ductile to brittle transition temperature.	A	3	
	e)	Explain three modes of fracture.	U	3	
	f)	Describe galvanic corrosion	U	4	
Q.3		Attempt any **TWO:**			**16**
	a)	i. Discuss dealloying corrosion. Give examples of dealloying. ii. Explain the effect of residual stresses on fracture.	U U	4 2	
	b)	Differentiate between ductile and brittle fracture.	A	3	
	c)	Define fracture toughness. Explain the relationship between crack size, stress concentration and crack tip radius.	U	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - PROGRAM : **Metallurgy**

COURSE CODE :- MTG403

COURSE NAME :- Failure analysis and selection of materials

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-02 /12 / 23

QN	SQN	SECTION –II	R/U/A	Co MTG 403	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	What is formability of material? write its significance.	R	4	
	b)	Discuss AISI specifications used for Stainless steels.	R	6	
	c)	Write the effect of carbon percentage on machinability of steel.	U	5	
	d)	Write chemical composition, properties and applications of Martensitic steel.	R	7	
	e)	Explain heat treatment process used for HSS.	U	7	
	f)	Suggest suitable material for surgical blade. Justify your selection.	R	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe stages of Creep.	U	6	
	b)	Explain factors in brief influencing machinability of material.	U	5	
	c)	Differentiate between soft magnet and hard magents.	A	5	
	d)	Explain Sensitization of 18-8 stainless steels.	A	6	
	e)	Suggest suitable material for following applications i)Cylinder block ii)Surgical tools	U	8	
	f)	Explain steps to be followed in material substitution for an existing design.	U	4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the steps of material selection for any design process.	A	4	
	b)	Write three general types of damages may occur to metals & alloys resulting in loss of strength at high temperature.	U	6	
	c)	How machinability of materials is measured?	A	5	
	d)	Write chemical composition and properties of Duralumin and Alnico alloys.	R	5	
	e)	What is mean by super alloys (Heat resistant alloys)? explain any one in detail.	U	6	
	f)	Write the classification of tool steels based on applications. Explain any one.	R	7	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM :Diploma in Metallurgical Engineering

COURSE CODE :- MTG 403

COURSE NAME :- Failure Analysis and selection of Materials

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/12/ **23**

QN	SQN	SECTION –I	R/U/A	Co MTG 403	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Why ductile fracture is less risky than brittle fracture?	U	2	
	b)	Write the types of NDT methods.	R	4	
	c)	Define erosion.	R	4	
	d)	What should be the content of failure analysis report.	R	1	
	e)	Write the two causes of intercrystalline brittle fracture.	R	2	
	f)	State the categories of stressors.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write the types of wear. Explain any one in detail.	U	4	
	b)	Differentiate between stress raisers and strength reducers.	U	2	
	c)	Explain the steps in the investigation of failure.	R	1	
	d)	Discuss the factors that influence ductile to brittle transition temperature.	A	3	
	e)	Explain three modes of fracture.	U	3	
	f)	Describe galvanic corrosion	U	4	
Q.3		Attempt any **TWO:**			**16**
	a)	i. Discuss dealloying corrosion. Give examples of dealloying. ii. Explain the effect of residual stresses on fracture.	U U	4 2	
	b)	Differentiate between ductile and brittle fracture.	A	3	
	c)	Define fracture toughness. Explain the relationship between crack size, stress concentration and crack tip radius.	U	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - PROGRAM : **Metallurgy**

COURSE CODE :- MTG403

COURSE NAME :- Failure analysis and selection of materials

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-02 /12 / 23

QN	SQN	SECTION –II	R/U/A	Co MTG 403	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	What is formability of material? write its significance.	R	4	
	b)	Discuss AISI specifications used for Stainless steels.	R	6	
	c)	Write the effect of carbon percentage on machinability of steel.	U	5	
	d)	Write chemical composition, properties and applications of Martensitic steel.	R	7	
	e)	Explain heat treatment process used for HSS.	U	7	
	f)	Suggest suitable material for surgical blade. Justify your selection.	R	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe stages of Creep.	U	6	
	b)	Explain factors in brief influencing machinability of material.	U	5	
	c)	Differentiate between soft magnet and hard magents.	A	5	
	d)	Explain Sensitization of 18-8 stainless steels.	A	6	
	e)	Suggest suitable material for following applications i)Cylinder block ii)Surgical tools	U	8	
	f)	Explain steps to be followed in material substitution for an existing design.	U	4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the steps of material selection for any design process.	A	4	
	b)	Write three general types of damages may occur to metals & alloys resulting in loss of strength at high temperature.	U	6	
	c)	How machinability of materials is measured?	A	5	
	d)	Write chemical composition and properties of Duralumin and Alnico alloys.	R	5	
	e)	What is mean by super alloys (Heat resistant alloys)? explain any one in detail.	U	6	
	f)	Write the classification of tool steels based on applications. Explain any one.	R	7	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM Winter -2023

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **METALURGY**

COURSE CODE: **MTG 302** COURSE NAME: **MATERIAL TESTING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **04/12 /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 IEE 309	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define young's modulus.	R	1	
	b)	Enlist various indentor used for Vicker's Hardness test.	R	3	
	c)	Define hardness.	U	3	
	d)	Write formula to calculate Brinell hardness test.	R	3	
	e)	Write effect of variables on tensile test.	U	2	
	f)	Explain the relation between linear stress and normal stress.	R	1	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain proof stress and it's necessity.	R	2	
	b)	Distinguish between elasticity & plasticity.	U	1	
	c)	Explain Poission's Ratio.	R	1	
	d)	Define and explain modulus of rigidity.	U	1	
	e)	ᴅᴇᴀᴡ the standard tensile testing specimen wit h specifications.	R	1	
	f)	Explain procedure to conduct Brinell hardness test.	R	3	
Q.3		Attempt any **TWO**			**(16)**
	a)	Draw neat labelled diagram of UTM. (Universal Testing Machine) Define i) % elongation ii) U.T.S.	R	2	
	b)	Write steps followed to conduct Rockwell Hardness Test. Also explain scale A,B & C	U	3	
	c)	Draw and explain stress- stress curve for i) Ductile material ii) Brittle material.	U / R	1	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG302

COURSE NAME :- MATERIAL TESTING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-04/12/23

QN	SQN		R/U/A	CO MTG 302	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State specimen arrangement in charpy and izod impact test	R	4	
	b)	Define endurance limit	U	5	
	c)	State surface conditions to improve fatigue life	U	5	
	d)	List the various types of NDT	R	7	
	e)	Explain the principle of magnetic particle testing	U	7	
	f)	State the formula for calculating impact velocity	R	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Differentiate between charpy and izod impact stregth.	R	4	
	b)	Write down the ways to improve fatigue stregth.	R	5	
	c)	Define creep,creep limit and creep strength.	R	6	
	d)	Explain creep failures.	U	6	
	e)	Write a short note on visual testing	R	7	
	f)	Explain S-N curve.What are the factors influencing SN curve.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the important variables in impact testing	U	4	
	b)	State the effect of important variables in fatigue testing	U	5	
	c)	Draw intergranular and transgranular fracture	R	6	
	d)	Explain the process of Dye panetrant testing	R	7	
	e)	Differetiate between Xray and gamma ray	R	7	
	f)	State the purpose and importance of NDT	R	7	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM Winter -2023

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **METALURGY**

COURSE CODE: **MTG 302** COURSE NAME: **MATERIAL TESTING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **04/12 /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 IEE 309	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define young's modulus.	R	1	
	b)	Enlist various indentor used for Vicker's Hardness test.	R	3	
	c)	Define hardness.	U	3	
	d)	Write formula to calculate Brinell hardness test.	R	3	
	e)	Write effect of variables on tensile test.	U	2	
	f)	Explain the relation between linear stress and normal stress.	R	1	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain proof stress and it's necessity.	R	2	
	b)	Distinguish between elasticity & plasticity.	U	1	
	c)	Explain Poission's Ratio.	R	1	
	d)	Define and explain modulus of rigidity.	U	1	
	e)	Draw the standard tensile testing specimen wit h specifications.	R	1	
	f)	Explain procedure to conduct Brinell hardness test.	R	3	
Q.3		Attempt any **TWO**			**(16)**
	a)	Draw neat labelled diagram of UTM. (Universal Testing Machine) Define i) % elongation ii) U.T.S.	R	2	
	b)	Write steps followed to conduct Rockwell Hardness Test. Also explain scale A,B & C	U	3	
	c)	Draw and explain stress- stress curve for i) Ductile material ii) Brittle material.	U / R	1	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG302

COURSE NAME :- MATERIAL TESTING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-04/12/23

QN	SQN		R/U/A	CO MTG 302	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State specimen arrangement in charpy and izod impact test	R	4	
	b)	Define endurance limit	U	5	
	c)	State surface conditions to improve fatigue life	U	5	
	d)	List the various types of NDT	R	7	
	e)	Explain the principle of magnetic particle testing	U	7	
	f)	State the formula for calculating impact velocity	R	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Differentiate between charpy and izod impact stregth.	R	4	
	b)	Write down the ways to improve fatigue stregth.	R	5	
	c)	Define creep,creep limit and creep strength.	R	6	
	d)	Explain creep failures.	U	6	
	e)	Write a short note on visual testing	R	7	
	f)	Explain S-N curve.What are the factors influencing SN curve.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the important variables in impact testing	U	4	
	b)	State the effect of important variables in fatigue testing	U	5	
	c)	Draw intergranular and transgranular fracture	R	6	
	d)	Explain the process of Dye panetrant testing	R	7	
	e)	Differetiate between Xray and gamma ray	R	7	
	f)	State the purpose and importance of NDT	R	7	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : DIPLOMA IN METALLURGICAL ENGG.

COURSE CODE :- MTG307

COURSE NAME :- PHYSICAL METALLURGY - I

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-04/12/23

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		R/U/A	CO MTG 307	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Enlist the imperfections observed in crystal structure of metals.	R	1	
	b)	Define Solid Solution .Write its types.	R	1	
	c)	State the meaning of "Phase" With respect to microstructure of metals.	R	2	
	d)	Define intermetallic compounds.	R	2	
	e)	Write down the Eutectoid reaction observed in Fe-C diagram.	R	3	
	f)	State the meaning of Eutectic reaction.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Calculate the Atomic packing factor for FCC unit cell.	U	1	
	b)	Draw the plane (100) and direction [110] with the help of suitable sketch of atomic unit cell.	U	1	
	c)	Describe the process of metal solidification; draw necessary sketch.	U	2	
	d)	Write down and explain the Hume Rothery's Rule of solid solution formation.	A	2	
	e)	Describe the changes in microstructure of 0.8 % C steel during cooling from austenitization temperature to room temperature.	U	3	
	f)	Describe the significance of Fe-C diagram in metallurgical field.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between substitutional solid solution and interstitial solid solution; Give examples.	U	2	
	b)	Explain the calculation of amount of phases with the application of Lever rule; draw necessary phase diagram.	A	2	
	c)	Draw Fe-C diagram with proper labeling of phases and temperatures.	A	3	
	d)	Explain the working of metallurgical microscope with the help of suitable sketch.	U	4	
	e)	Write down any two etching reagents with their detail chemical composition and applications.	U	4	
	f)	Illustrate the allotropic changes in iron with suitable sketch.	U	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG307

COURSE NAME :- Physical Metallurgy I

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 04/12/23

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		R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write down the classification of Cast Iron on the basis of microstructure.	R	5	
	b)	Give the composition of white cast iron.	R	5	
	c)	State four important properties of copper.	R	6	
	d)	Differentiate between brasses and bronzes. (Two points)	U	6	
	e)	Give classification of bearing materials.	R	6	
	f)	Write down the composition of lead based babbitts.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe the malleablizing heat treatment cycle.	U	5	
	b)	Differentiate between white cast iron and grey cast iron. (Four points)	R	5	
	c)	Describe dezincification of brass. State remedies on it.	R	6	
	d)	Describe about following bronzes in brief (i) Gun Metal, (ii) Phosphor bronze.	U	6	
	e)	State four properties and four applications of aluminium and its alloys.	A	6	
	f)	Enlist four requirements of good bearing metals.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the steps of conversion of grey cast iron into nodular cast iron. Draw microstructure of nodular cast iron.	A	5	
	b)	Describe graphitization in cast iron. State relation of microstructure with properties of cast iron.	U	5	
	c)	Define season cracking of brasses. State causes and remedies on it.	R	6	
	d)	Explain the term "modification" in Al-Si alloys with equilibrium diagram.	U	6	
	e)	Write down composition, two properties and two applications of duralumin.	R	6	
	f)	Explain the effect of copper addition in bearing metals.	A	6	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : DIPLOMA IN METALLURGICAL ENGG.

COURSE CODE :- MTG307

COURSE NAME :- PHYSICAL METALLURGY - I

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-04/12/23

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		R/U/A	CO MTG 307	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Enlist the imperfections observed in crystal structure of metals.	R	1	
	b)	Define Solid Solution .Write its types.	R	1	
	c)	State the meaning of "Phase" With respect to microstructure of metals.	R	2	
	d)	Define intermetallic compounds.	R	2	
	e)	Write down the Eutectoid reaction observed in Fe-C diagram.	R	3	
	f)	State the meaning of Eutectic reaction.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Calculate the Atomic packing factor for FCC unit cell.	U	1	
	b)	Draw the plane (100) and direction [110] with the help of suitable sketch of atomic unit cell.	U	1	
	c)	Describe the process of metal solidification; draw necessary sketch.	U	2	
	d)	Write down and explain the Hume Rothery's Rule of solid solution formation.	A	2	
	e)	Describe the changes in microstructure of 0.8 % C steel during cooling from austenitization temperature to room temperature.	U	3	
	f)	Describe the significance of Fe-C diagram in metallurgical field.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between substitutional solid solution and interstitial solid solution; Give examples.	U	2	
	b)	Explain the calculation of amount of phases with the application of Lever rule; draw necessary phase diagram.	A	2	
	c)	Draw Fe-C diagram with proper labeling of phases and temperatures.	A	3	
	d)	Explain the working of metallurgical microscope with the help of suitable sketch.	U	4	
	e)	Write down any two etching reagents with their detail chemical composition and applications.	U	4	
	f)	Illustrate the allotropic changes in iron with suitable sketch.	U	3	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG307

COURSE NAME :- Physical Metallurgy I

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 04/12/23

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		R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write down the classification of Cast Iron on the basis of microstructure.	R	5	
	b)	Give the composition of white cast iron.	R	5	
	c)	State four important properties of copper.	R	6	
	d)	Differentiate between brasses and bronzes. (Two points)	U	6	
	e)	Give classification of bearing materials.	R	6	
	f)	Write down the composition of lead based babbitts.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe the malleablizing heat treatment cycle.	U	5	
	b)	Differentiate between white cast iron and grey cast iron. (Four points)	R	5	
	c)	Describe dezincification of brass. State remedies on it.	R	6	
	d)	Describe about following bronzes in brief (i) Gun Metal, (ii) Phosphor bronze.	U	6	
	e)	State four properties and four applications of aluminium and its alloys.	A	6	
	f)	Enlist four requirements of good bearing metals.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the steps of conversion of grey cast iron into nodular cast iron. Draw microstructure of nodular cast iron.	A	5	
	b)	Describe graphitization in cast iron. State relation of microstructure with properties of cast iron.	U	5	
	c)	Define season cracking of brasses. State causes and remedies on it.	R	6	
	d)	Explain the term "modification" in Al-Si alloys with equilibrium diagram.	U	6	
	e)	Write down composition, two properties and two applications of duralumin.	R	6	
	f)	Explain the effect of copper addition in bearing metals.	A	6	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM :

COURSE CODE :- MTG-502 / MTF502

COURSE NAME :- Environment protection in metallurgical Industry

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-05/12/23

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 MTG 502	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What are the classification of pollutants?	A	1	
	b)	Define Dry collectors.	A	2	
	c)	Explain the emission points in a typical foundry.	R	2	
	d)	Which type of remedial measures are used to reduce air pollution	R	3	
	e)	Define Acid Rain	A	5	
	f)	Write down the sources of noise pollution	A	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Discuss wild life (protection) Act 1972	U	1	
	b)	What type of harmful substances generated in drying moulds and cores in iron foundries	R	2	
	c)	Classify the waste generated in foundries.	R	2	
	d)	Discuss the effects of harmful substances evolved in picking bath	R	3	
	e)	Write down the sources and effects of noise pollution	R	4	
	f)	Discuss effects and control measures of the Acid rain.	R	5	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain pollution prevention methods for foundries	U	2	
	b)	Write a short note on health hazards in foundries	U	2	
	c)	Discuss Recommendation to reducing air pollution	R	3	
	d)	Explain prevention and control of noise pollution	R	4	
	e)	Write a short note on effects and control measures of ozone layer depletion	U	5	
	f)	Write down about cyclone and scrubber based system for coal fired furnaces.	U	2	
		P.T.O.			

QN	SQN	SECTION –II	R/U/A	Co MTG 502	Marks
Q.4		Attempt any FOUR:			08
	a)	State ' reclamation of waste foundry sand in foundries'	R	5	
	b)	Define Environmental Impact Assessment.	U	6	
	c)	Write the purpose of environmental audit?	U	9	
	d)	State the meaning of thermal pollution and radiation pollution	R	8	
	e)	Define solid waste?	R	7	
	f)	Write the sources of thermal pollution?	R	8	
Q.5		Attempt any FOUR:			16
	a)	Comment on landfilling used in disposal of solid waste.	U	5	
	b)	Explain preliminary and primary waste water treatment.	U	6	
	c)	Explain environment impact assessment?	A	9	
	d)	Define hazardous waste and explain hazardous waste management.	A	7	
	e)	Explain thermal reclamation of synthetic sand in foundries.	U	7	
	f)	Explain sources and effects of radiation pollution	U	8	
Q.6		Attempt any FOUR:			16
	a)	Comment on Photochemical smog and green house effects	U	5	
	b)	Explain sludge treatment	U	6	
	c)	Explain the principle of Reduce, Reuse, and Recycle.	A	7	
	d)	Comment on Radiation pollution protection	U	8	
	e)	Define solid waste? Explains its classification.	A	7	
	f)	Write the control measures of radiation pollution	A	8	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM :

COURSE CODE :- MTG-502/MTE502

COURSE NAME :- Environment protection in metallurgical Industry

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-05/12/23

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 MTG 502	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What are the classification of pollutants?	A	1	
	b)	Define Dry collectors.	A	2	
	c)	Explain the emission points in a typical foundry.	R	2	
	d)	Which type of remedial measures are used to reduce air pollution	R	3	
	e)	Define Acid Rain	A	5	
	f)	Write down the sources of noise pollution	A	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Discuss wild life (protection) Act 1972	U	1	
	b)	What type of harmful substances generated in drying moulds and cores in iron foundries	R	2	
	c)	Classify the waste generated in foundries.	R	2	
	d)	Discuss the effects of harmful substances evolved in picking bath	R	3	
	e)	Write down the sources and effects of noise pollution	R	4	
	f)	Discuss effects and control measures of the Acid rain.	R	5	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain pollution prevention methods for foundries	U	2	
	b)	Write a short note on health hazards in foundries	U	2	
	c)	Discuss Recommendation to reducing air pollution	R	3	
	d)	Explain prevention and control of noise pollution	R	4	
	e)	Write a short note on effects and control measures of ozone layer depletion	U	5	
	f)	Write down about cyclone and scrubber based system for coal fired furnaces.	U	2	
		P.T.O.			

QN	S Q N	SECTION –II	R/ U/ A	Co MTG 502	Ma rks
Q.4		Attempt any FOUR:			08
	a)	State ' reclamation of waste foundry sand in foundries'	R	5	
	b)	Define Environmental Impact Assessment.	U	6	
	c)	Write the purpose of environmental audit?	U	9	
	d)	State the meaning of thermal pollution and radiation pollution	R	8	
	e)	Define solid waste?	R	7	
	f)	Write the sources of thermal pollution?	R	8	
Q.5		Attempt any FOUR:			16
	a)	Comment on landfilling used in disposal of solid waste.	U	5	
	b)	Explain preliminary and primary waste water treatment.	U	6	
	c)	Explain environment impact assessment?	A	9	
	d)	Define hazardous waste and explain hazardous waste management.	A	7	
	e)	Explain thermal reclamation of synthetic sand in foundries.	U	7	
	f)	Explain sources and effects of radiation pollution	U	8	
Q.6		Attempt any FOUR:			16
	a)	Comment on Photochemical smog and green house effects	U	5	
	b)	Explain sludge treatment	U	6	
	c)	Explain the principle of Reduce, Reuse, and Recycle.	A	7	
	d)	Comment on Radiation pollution protection	U	8	
	e)	Define solid waste? Explains its classification.	A	7	
	f)	Write the control measures of radiation pollution	A	8	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**

COURSE CODE :- **MTG306**

COURSE NAME **ELECTRICAL ENGINEERING & ELECTRONICS**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **06/ 12 / 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 306**	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Ohm's law. Write its mathematical Form.	U	1	
	b)	Define resistance. State its unit.	R	1	
	c)	Instantaneous value of AC current is given by i=50 Sin (314 t + π/2) Amps. Find RMS value of current.	A	2	
	d)	Illustrate simple electrical network to show method of ammeter and voltmeter connection for measurement of current and voltage respectively in 1-ϕ circuit.	U	2	
	e)	State any two applications of digital multimeter.	R	2	
	f)	State applications of following i) DC series motor. ii) Squirrel cage induction motor.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Find equivalent resistance R_{AB} in the circuit shown in Fig. (a)	A	1	
	b)	State any four advantages of three phase system over single phase system.	R	2	
	c)	Draw and explain construction details of permanent magnet moving coil instrument. (PMMC)	U	2	
	d)	Calculate line current and phase voltage for given star connected load shown in below Fig. (b)	A	2	
	e)	Explain concept of rotating magnetic field with neat diagram in three phase induction motor.	U	3	
	f)	With neat sketch, describe working of single phase transformer.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the factors on which value of resistance is depends. Explain in short.	U	1	
	b)	A resistance heater is connected across 220V DC. It draws 5A current from source. Determine value of resistance, power drawn, and energy consumed if heater is operated for time duration of 2 Hours.	A	1	
	c)	State the necessity of earthing. List out types of earthing and explain any one in short.	U	2	
	d)	Define the following i) Cycle ii) Frequency iii) Time period iv) RMS value.	R	2	
	e)	Compare squirrel cage induction motor and slip ring induction motor.	R	3	
	f)	With neat sketch explain working of universal motor. State any four applications of it.	U	3	

P.T.O.

2 a]

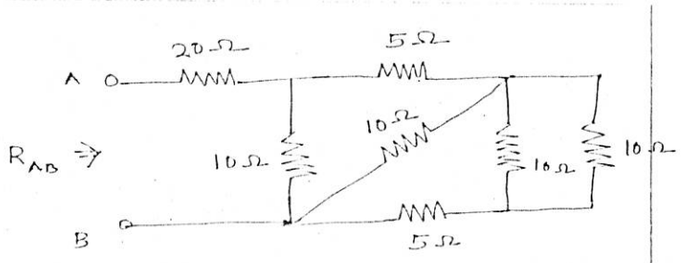

Fig.(a)

2 d]

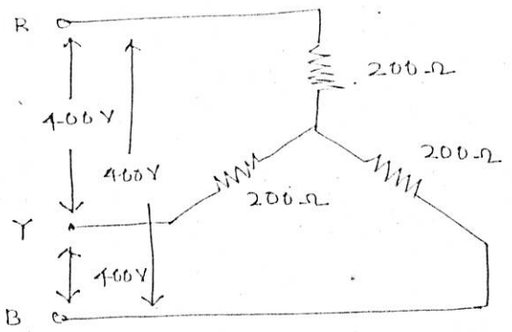

Fig.(b)

QN	SQN	SECTION –II	R/U/A	Co EEF 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw symbol of Resistor and inductor. Also state their units.	R	4	
	b)	Enlist temperature sensors.	R	5	
	c)	Convert $(48)_{10}$ to equivalent binary number.	A	6	
	d)	Draw symbol of i) PNP transistor ii) NPN transistor	R	4	
	e)	Convert $(4056)_{16} = (\ )_{10}$.	A	6	
	f)	Draw symbol of NAND gate and give its truth table.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Define i) Photo current ii) Dark current.	R	4	
	b)	With help of neat circuit diagram. Explain working of forward Biased diode.	U	5	
	c)	Draw a internal structure of IC of NOR gate. Give numbers to pins. Also name the pins as input or output pin.	R	6	
	d)	Draw symbol of i) LED ii) LDR iii) Photo diode iv) PN diode.	R	4	
	e)	Draw block diagram of electronics measuring system and explain each block.	U	5	
	f)	Define and classify transducers.	R	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain working principle of i) Push button ii) Relay.	U	4	
	b)	Explain working of thermocouple.	U	5	
	c)	Give truthtable of i) AND ii) OR iii) EX-OR iv) NOT gate	R	6	
	d)	i) Draw common emitter configuration of transistor. ii) Enlist two applications of PN junction diode.	R	4	
	e)	Classify measuring instruments. Name two flow sensors.	R	5	
	f)	Explain working of Bourdon tube pressure transducer.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**

COURSE CODE :- **MTG306**

COURSE NAME **ELECTRICAL ENGINEERING & ELECTRONICS**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **06/ 12 / 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 306**	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Ohm's law. Write its mathematical Form.	U	1	
	b)	Define resistance. State its unit.	R	1	
	c)	Instantaneous value of AC current is given by i=50 Sin (314 t + π/2) Amps. Find RMS value of current.	A	2	
	d)	Illustrate simple electrical network to show method of ammeter and voltmeter connection for measurement of current and voltage respectively in 1-ϕ circuit.	U	2	
	e)	State any two applications of digital multimeter.	R	2	
	f)	State applications of following i) DC series motor. ii) Squirrel cage induction motor.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Find equivalent resistance R_{AB} in the circuit shown in Fig. (a)	A	1	
	b)	State any four advantages of three phase system over single phase system.	R	2	
	c)	Draw and explain construction details of permanent magnet moving coil instrument. (PMMC)	U	2	
	d)	Calculate line current and phase voltage for given star connected load shown in below Fig. (b)	A	2	
	e)	Explain concept of rotating magnetic field with neat diagram in three phase induction motor.	U	3	
	f)	With neat sketch, describe working of single phase transformer.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the factors on which value of resistance is depends. Explain in short.	U	1	
	b)	A resistance heater is connected across 220V DC. It draws 5A current from source. Determine value of resistance, power drawn, and energy consumed if heater is operated for time duration of 2 Hours.	A	1	
	c)	State the necessity of earthing. List out types of earthing and explain any one in short.	U	2	
	d)	Define the following i) Cycle ii) Frequency iii) Time period iv) RMS value.	R	2	
	e)	Compare squirrel cage induction motor and slip ring induction motor.	R	3	
	f)	With neat sketch explain working of universal motor. State any four applications of it.	U	3	

P.T.O.

2 a]

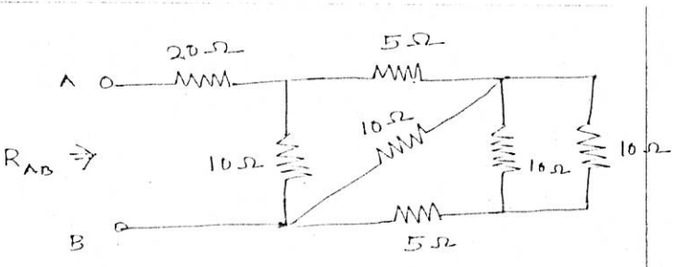

Fig.-(a)

2- d]

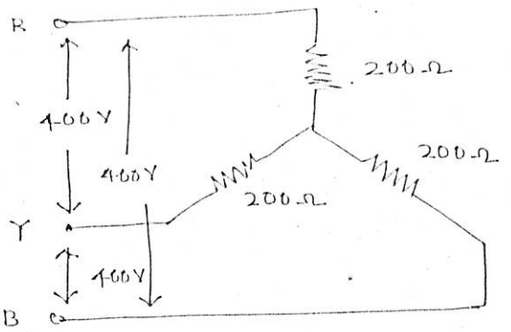

Fig.-(b)

QN	SQN	SECTION –II	R/U/A	Co EEF 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw symbol of Resistor and inductor. Also state their units.	R	4	
	b)	Enlist temperature sensors.	R	5	
	c)	Convert $(48)_{10}$ to equivalent binary number.	A	6	
	d)	Draw symbol of i) PNP transistor ii) NPN transistor	R	4	
	e)	Convert $(4056)_{16} = (\ )_{10}$.	A	6	
	f)	Draw symbol of NAND gate and give its truth table.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Define i) Photo current ii) Dark current.	R	4	
	b)	With help of neat circuit diagram. Explain working of forward Biased diode.	U	5	
	c)	Draw a internal structure of IC of NOR gate. Give numbers to pins. Also name the pins as input or output pin.	R	6	
	d)	Draw symbol of i) LED ii) LDR iii) Photo diode iv) PN diode.	R	4	
	e)	Draw block diagram of electronics measuring system and explain each block.	U	5	
	f)	Define and classify transducers.	R	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain working principle of i) Push button ii) Relay.	U	4	
	b)	Explain working of thermocouple.	U	5	
	c)	Give truthtable of i) AND ii) OR iii) EX-OR iv) NOT gate	R	6	
	d)	i) Draw common emitter configuration of transistor. ii) Enlist two applications of PN junction diode.	R	4	
	e)	Classify measuring instruments. Name two flow sensors.	R	5	
	f)	Explain working of Bourdon tube pressure transducer.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**

COURSE CODE :- **MTG305**

COURSE NAME **FOUNDRY TECHNOLOGY - I**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **06/ 12 / 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)	Define Foundry.	R	1	
	b)	State the role of pattern in foundry.	R	2	
	c)	Enlist various pattern lifting devices.	R	2	
	d)	State the importance of testing moulding sand.	R	3	
	e)	Explain the term core venting.	R	3	
	f)	Enlist the principle ingredients of resin sand.	R	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	State any two advantages and limitations of castings over forgings.	R	1	
	b)	Give list of different materials used for making patterns. Compare metal and wood as pattern materials.	U	2	
	c)	Mention the significance of parting line selection in molding. Describe the factors for parting line selection.	U	2	
	d)	Describe the procedure for determination of clay content in molding sand.	U	3	
	e)	Explain any one method of foundry sand reclaimation. Give applications of reclaimed sand.	A	3	
	f)	Explain the steps in the process of shell molding.	U	4	
Q.3		Attempt any **TWO:**			**16**
	a)	Enlist various types of patterns. Explain the use of loose piece pattern and match plate pattern in molding with neat diagrams.	U	2	
	b)	Define permeability of molding sand with a neat diagram of permeability tester explain the steps in measurement of permeability.	U	3	
	c)	Explain Co2 molding process with its principle, ingredients, procedure, advantages, limitations and application.	U	4	

P.T.O

QN	SQN	Question Text	R/U/A	Co MTG 305	**Marks**
Q.4		Attempt any **FOUR:**			**08**
	a)	Write any four applications of ceramic molding.	R	5	
	b)	Write principle of gravity die casting.	U	4	
	c)	Define slush casting.	R	5	
	d)	~~Enlist different types of cupola.~~ Write the principle of centrifugal casting process	R	6	
	e)	Define shot blasting.	U	7	
	f)	Suggest suitable moulding process for making piston ring.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain applications, size range limitations, advantages of continuous casting.	U	4	
	b)	Explain plaster molding with diagram.	R	5	
	c)	~~Describe proactive equipments used in melting section of cupola.~~ Explain cold chamber die casting process	U	6	
	d)	~~Name different temperature zones of cupola. Explain it with a neat diagram.~~ Describe with neat sketch gravity die casting process	U	6	
	e)	Explain in detail submerged plunger type hot chamber die casting.	R	4	
	f)	Suggest and justify moulding process for manufacture of lathe bed.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain centrifugal casting with diagram.	U	4	
	b)	Explain slush casting with diagram its applications merits and demerits.	U	5	
	c)	Explain low pressure gravity die casting. Give its merits and demerits	R	4	
	d)	Explain investment casting with diagram.	U	5	
	e)	~~Draw a schematic diagram of cupola and explain the reactions.~~	R	6	
	f)	~~Define fettling, cl~~eaning Tumbling, sand blasting.	U	7	

e) Write the pattern used in investment casting. Explain its properties.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**

COURSE CODE :- **MTG305**

COURSE NAME **FOUNDRY TECHNOLOGY - I**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **06/ 12 / 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)	Define Foundry.	R	1	
	b)	State the role of pattern in foundry.	R	2	
	c)	Enlist various pattern lifting devices.	R	2	
	d)	State the importance of testing moulding sand.	R	3	
	e)	Explain the term core venting.	R	3	
	f)	Enlist the principle ingredients of resin sand.	R	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	State any two advantages and limitations of castings over forgings.	R	1	
	b)	Give list of different materials used for making patterns. Compare metal and wood as pattern materials.	U	2	
	c)	Mention the significance of parting line selection in molding. Describe the factors for parting line selection.	U	2	
	d)	Describe the procedure for determination of clay content in molding sand.	U	3	
	e)	Explain any one method of foundry sand reclaimation. Give applications of reclaimed sand.	A	3	
	f)	Explain the steps in the process of shell molding.	U	4	
Q.3		Attempt any **TWO:**			**16**
	a)	Enlist various types of patterns. Explain the use of loose piece pattern and match plate pattern in molding with neat diagrams.	U	2	
	b)	Define permeability of molding sand with a neat diagram of permeability tester explain the steps in measurement of permeability.	U	3	
	c)	Explain Co2 molding process with its principle, ingredients, procedure, advantages, limitations and application.	U	4	

P.T.O

QN	SQN	Question Text	R/U/A	Co MTG 305	**Marks**
Q.4		Attempt any **FOUR:**			**08**
	a)	Write any four applications of ceramic molding.	R	5	
	b)	Write principle of gravity die casting.	U	4	
	c)	Define slush casting.	R	5	
	d)	Enlist different types of cupola. write the principle of Centrifugal casting process	R	6	
	e)	Define shot blasting.	U	7	
	f)	Suggest suitable moulding process for making piston ring.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain applications, size range limitations, advantages of continuous casting.	U	4	
	b)	Explain plaster molding with diagram.	R	5	
	c)	Describe proactive equipments used in melting section of cupola. Explain cold chamber die casting process	U	6	
	d)	Name different temperature zones of cupola. Explain it with a neat diagram. Describe with neat sketch gravity die casting process.	U	6	
	e)	Explain in detail submerged plunger type hot chamber die casting.	R	4	
	f)	Suggest and justify moulding process for manufacture of lathe bed.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain centrifugal casting with diagram.	U	4	
	b)	Explain slush casting with diagram its applications merits and demerits.	U	5	
	c)	Explain low pressure gravity die casting. Give its merits and demerits	R	4	
	d)	Explain investment casting with diagram.	U	5	
	e)	Draw a schematic diagram of cupola and explain the reactions.	R	6	
	f)	Define fettling, cleaning Tumbling, sand blasting.	U	7	

e) write the pattern used in investment casting. Explain its properties.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - III PROGRAM: Metallurgical Engineering

COURSE CODE:-MTG304

COURSE NAME: - Iron and Steel making

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -08/12/23

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	Question Text	R/U/A	Co MTG 304	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write any four names of iron ores along with %Fe.	R	1	
	b)	Define beneficiation and enlist its different methods.	R	1	
	c)	Write at least four benefits of 'High top pressure' used in Blast furnace operation.	U	1	
	d)	Process of dephosphorization is favored by which three conditions?	U	3	
	e)	Write significance of decarburization reaction in steel making.	U	3	
	f)	Give average composition of pig iron obtained from blast furnace	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write short note on Disc pelletizer along with a neat diagram.	R	1	
	b)	Draw a neat labelled diagram of Blast Furnace.	R	2	
	c)	Describe Principle of deoxidation reaction along with mechanism and its types.	U	3	
	d)	State important functions of Coke. Write requirements of good Coke.	U	1	
	e)	Explain any four irregularities observed in Blast furnace.	A	2	
	f)	Explain ANY TWO modern trends in Blast Furnace.	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate Between Sinter and Pellets.	R	1	
	b)	Explain different Blast furnace Operations.	U	2	
	c)	Explain Principle of 'Desulphurization' in steel making process.	R	3	
	d)	Describe principle of Basic steel making and Acid steel making.	R	3	
	e)	Write functions of Gas cleaning system in blast furnace.	A	2	
	f)	Enlist various raw materials used for iron making. Give approximate quantity of raw material required for production of one ton pig iron.	A	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 304	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	List out various types of steel making furnaces.	U	4	
	b)	Write down principle of Bessemer Process.	R	4	
	c)	State various decarburization technique of steel.	R	5	
	d)	What is secondary steel making?	A	5	
	e)	State merits of continuous casting process.	A	5	
	f)	State the basic difference between LD converter and Kaldo process of steel making.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw a neat and clean diagram of open hearth furnace showing all parts.	R	4	
	b)	With label diagram explain induction furnace.	U	4	
	c)	Explain merits and demerits of rotor process of steel making.	A	4	
	d)	Write down the AOD process of Decarburization of technique.	R	5	
	e)	Give types of continuous casting machine in details.	U	6	
	f)	Explain ESR process of steel making.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	With lable diagram explain Electric arc furnace.	A	4	
	b)	State merits and demerits of bessmer process of steel making.	R	4	
	c)	State principle of Kaldo process and characteristics of steel produced.	U	4	
	d)	Explain VOD process of decarburization technique.	R	5	
	e)	Explain Ladle degassing of steel treatment.	U	5	
	f)	State any one process of continuous casting process.	R	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - III PROGRAM: Metallurgical Engineering

COURSE CODE:-MTG304

COURSE NAME: - Iron and Steel making

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -08/12/23

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	Question Text	R/U/A	Co MTG 304	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write any four names of iron ores along with %Fe.	R	1	
	b)	Define beneficiation and enlist its different methods.	R	1	
	c)	Write at least four benefits of 'High top pressure' used in Blast furnace operation.	U	1	
	d)	Process of dephosphorization is favored by which three conditions?	U	3	
	e)	Write significance of decarburization reaction in steel making.	U	3	
	f)	Give average composition of pig iron obtained from blast furnace	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write short note on Disc pelletizer along with a neat diagram.	R	1	
	b)	Draw a neat labelled diagram of Blast Furnace.	R	2	
	c)	Describe Principle of deoxidation reaction along with mechanism and its types.	U	3	
	d)	State important functions of Coke. Write requirements of good Coke.	U	1	
	e)	Explain any four irregularities observed in Blast furnace.	A	2	
	f)	Explain ANY TWO modern trends in Blast Furnace.	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate Between Sinter and Pellets.	R	1	
	b)	Explain different Blast furnace Operations.	U	2	
	c)	Explain Principle of 'Desulphurization' in steel making process.	R	3	
	d)	Describe principle of Basic steel making and Acid steel making.	R	3	
	e)	Write functions of Gas cleaning system in blast furnace.	A	2	
	f)	Enlist various raw materials used for iron making. Give approximate quantity of raw material required for production of one ton pig iron.	A	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 304	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	List out various types of steel making furnaces.	U	4	
	b)	Write down principle of Bessemer Process.	R	4	
	c)	State various decarburization technique of steel.	R	5	
	d)	What is secondary steel making?	A	5	
	e)	State merits of continuous casting process.	A	5	
	f)	State the basic difference between LD converter and Kaldo process of steel making.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw a neat and clean diagram of open hearth furnace showing all parts.	R	4	
	b)	With label diagram explain induction furnace.	U	4	
	c)	Explain merits and demerits of rotor process of steel making.	A	4	
	d)	Write down the AOD process of Decarburization of technique.	R	5	
	e)	Give types of continuous casting machine in details.	U	6	
	f)	Explain ESR process of steel making.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	With lable diagram explain Electric arc furnace.	A	4	
	b)	State merits and demerits of bessmer process of steel making.	R	4	
	c)	State principle of Kaldo process and characteristics of steel produced.	U	4	
	d)	Explain VOD process of decarburization technique.	R	5	
	e)	Explain Ladle degassing of steel treatment.	U	5	
	f)	State any one process of continuous casting process.	R	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : **Diploma in Metallurgical Engineering**

COURSE CODE :- MTG309

COURSE NAME :- Furnace, Refractories and Pyrometry

MAX. MARKS : 80 TIME : 03 Hrs DATE :-08/12/23

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	Question Text.	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Refractory.	R	1	
	b)	Enlist four furnaces.	A	2	
	c)	State the use of burners and fans in furnace.	U	2	
	d)	State the applications of reverberatory furnace.	A	3	
	e)	Give two advantages of electric resistance furnace.	U	3	
	f)	Enlist applications of muffle Furnace.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Give classification of refractories. Give one example of each. Write one application of each type of refractory.	A	1	
	b)	Enlist four important properties of refractories. Explain importance of each property of refractory in furnace.	U	1	
	c)	Describe working of open hearth furnace.	R	3	
	d)	State working principle of rotary furnace. Draw neat sketch of it.	R	2	
	e)	Draw neat sketch of cupola furnace.	A	2	
	f)	Explain working of indirect arc furnace with neat sketch.	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the various factors considered during selection of refractory.	R	1	
	b)	Enlist various tests carried out on refractories. Explain anyone.	R	1	
	c)	Explain the construction of reverberatory furnace with neat sketch.	U	3	
	d)	Draw neat sketch of open hearth furnace.	A	3	
	e)	State advantages, disadvantages and applications of pit type furnace.	R	2	
	f)	Describe working of cupola furnace.	R	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 309	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State two advantages of direct arc furnace.	A	4	
	b)	Write principle of Arc furnace.	U	4	
	c)	List various induction furnaces.	R	4	
	d)	Why liquid heel necessary in core type induction furnace.	U	4	
	e)	Enlist various melting furnace for service of Non-ferrous metal.	R	5	
	f)	State uses of lift out type furnace.	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write working of core type main frequency induction furnace with diagram.	U	4	
	b)	Write principle and advantages of indirect arc furnace.	R	4	
	c)	State advantages of Direct arc furnace over indirect are furnace.	A	4	
	d)	Write principle of induction melting. Which refractory suitable for CI making in induction furnace.	U	4	
	e)	Write working of crucible melting furnace used for AI-Melt production.	R	5	
	f)	State two advantages and application of Tilting furnace.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	List various temperatures measuring device. State role of Segar cones.	A	6	
	b)	Distinguish between metallic expansion thermometer and Gas expansion thermometer.	R	6	
	c)	Define thermocouple. How they classify. Give one example of contact type thermocouple.	U	6	
	d)	Write principle of optical pyrometer. Give its example.	R	6	
	e)	Write down principle and use of resistance pyrometer.	A	6	
	f)	Explain seeback effect.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : **Diploma in Metallurgical Engineering**

COURSE CODE :- MTG309

COURSE NAME :- Furnace, Refractories and Pyrometry

MAX. MARKS : 80 TIME : 03 Hrs DATE :-08/12/23

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

QN	SQN	Question Text.	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Refractory.	R	1	
	b)	Enlist four furnaces.	A	2	
	c)	State the use of burners and fans in furnace.	U	2	
	d)	State the applications of reverberatory furnace.	A	3	
	e)	Give two advantages of electric resistance furnace.	U	3	
	f)	Enlist applications of muffle Furnace.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Give classification of refractories. Give one example of each. Write one application of each type of refractory.	A	1	
	b)	Enlist four important properties of refractories. Explain importance of each property of refractory in furnace.	U	1	
	c)	Describe working of open hearth furnace.	R	3	
	d)	State working principle of rotary furnace. Draw neat sketch of it.	R	2	
	e)	Draw neat sketch of cupola furnace.	A	2	
	f)	Explain working of indirect arc furnace with neat sketch.	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the various factors considered during selection of refractory.	R	1	
	b)	Enlist various tests carried out on refractories. Explain anyone.	R	1	
	c)	Explain the construction of reverberatory furnace with neat sketch.	U	3	
	d)	Draw neat sketch of open hearth furnace.	A	3	
	e)	State advantages, disadvantages and applications of pit type furnace.	R	2	
	f)	Describe working of cupola furnace.	R	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 309	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State two advantages of direct arc furnace.	A	4	
	b)	Write principle of Arc furnace.	U	4	
	c)	List various induction furnaces.	R	4	
	d)	Why liquid heel necessary in core type induction furnace.	U	4	
	e)	Enlist various melting furnace for service of Non-ferrous metal.	R	5	
	f)	State uses of lift out type furnace.	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write working of core type main frequency induction furnace with diagram.	U	4	
	b)	Write principle and advantages of indirect arc furnace.	R	4	
	c)	State advantages of Direct arc furnace over indirect are furnace.	A	4	
	d)	Write principle of induction melting. Which refractory suitable for CI making in induction furnace.	U	4	
	e)	Write working of crucible melting furnace used for AI-Melt production.	R	5	
	f)	State two advantages and application of Tilting furnace.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	List various temperatures measuring device. State role of Segar cones.	A	6	
	b)	Distinguish between metallic expansion thermometer and Gas expansion thermometer.	R	6	
	c)	Define thermocouple. How they classify. Give one example of contact type thermocouple.	U	6	
	d)	Write principle of optical pyrometer. Give its example.	R	6	
	e)	Write down principle and use of resistance pyrometer.	A	6	
	f)	Explain seeback effect.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

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 :- 11/12/23

QN	SQN	Question Text	R/U/A	CO MTG 301	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define entropy	R	3	
	b)	State third law of thermodyanamics	U	4	
	c)	State Gibb's phase rule	R	4	
	d)	State Zeroth law	R	4	
	e)	State Rault's law	R	4	
	f)	Define Ellingham diagram	R	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write Clausius statement of second law of thermodyanamics.Give example.	U	3	
	b)	Calculate the entropy change for the following reaction $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O$ | | CH_4 | O_2 | CO_2 | H_2O | | ▲ S in J/mol K | 186 | 205 | 214 | 69.9 |	A	4	
	c)	State Henry's law and give its importance.	R	4	
	d)	Explain metallothermic reduction process	R	5	
	e)	State characteristics of ellingham diagram	A	5	
	f)	Explain the entropy change for reversible and irreversible process.	R	3	
Q.6		Attempt any **TWO:**			**16**
	a)	Give examples of second law of thermodyanamics and its applications	U	3	
	b)	Explain the concept of free energy and stability of compound	U	4	
	c)	Explain the general form of Ellingham diagram	R	5	

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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 :- MTG 301

COURSE NAME :- METALLURGICAL THERMODYNAMICS

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: - 11 /12/ **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	Question Text.	R/U/A	Co MTG 301	Marks
Q.1		Attempt any **FOUR:**	U	1	**08**
	a)	Define thermodynamics.	R	2	
	b)	State the 1st law of thermodynamics.	U	1	
	c)	Enlist and define thermodynamic system.	A	1	
	d)	Enlist thermodynamic process.	A	1	
	e)	Define Enthalpy with its SI unit.	U	2	
	f)	State Hess's law.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Distinguish between reversible and irreversible process.	R	1	
	b)	Explain closed system and open system.	U	1	
	c)	Explain forms of energy and properties of energy.	A	1	
	d)	State the internal energy as a state property.	A	2	
	e)	Explain Heat capacity.	R	2	
	f)	State the SI units of following terms. 1. Entropy 2. Enthalpy 3.Internal Energy 4. Specific Heat	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain thermodynamic equilibrium.	U	1	
	b)	Derive the mathematical expression for Enthalpy.	A	2	
	c)	Explain Intensive and extensive properties.	R	1	
	d)	State the relation between Cp and Cv	A	2	
	e)	Prove Cv = dU/dT at constant volume	A	2	
	f)	Represent and explain the following processes on PV diagram 1. Isobaric and adiabatic.	R	1	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

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 :- 11/12/23

QN	SQN	Question Text	R/U/A	CO MTG 301	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define entropy	R	3	
	b)	State third law of thermodyanamics	U	4	
	c)	State Gibb's phase rule	R	4	
	d)	State Zeroth law	R	4	
	e)	State Rault's law	R	4	
	f)	Define Ellingham diagram	R	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write Clausius statement of second law of thermodyanamics.Give example.	U	3	
	b)	Calculate the entropy change for the following reaction $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O$ ▲ S in J/mol K: CH_4 = 186, O_2 = 205, CO_2 = 214, H_2O = 69.9	A	4	
	c)	State Henry's law and give its importance.	R	4	
	d)	Explain metallothermic reduction process	R	5	
	e)	State characteristics of ellingham diagram	A	5	
	f)	Explain the entropy change for reversible and irreversible process.	R	3	
Q.6		Attempt any **TWO:**			**16**
	a)	Give examples of second law of thermodyanamics and its applications	U	3	
	b)	Explain the concept of free energy and stability of compound	U	4	
	c)	Explain the general form of Ellingham diagram	R	5	

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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 :- MTG 301

COURSE NAME :- METALLURGICAL THERMODYNAMICS

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: - 11 /12/ **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	Question Text.	R/U/A	Co MTG 301	Marks
Q.1		Attempt any **FOUR:**	U	1	**08**
	a)	Define thermodynamics.	R	2	
	b)	State the 1st law of thermodynamics.	U	1	
	c)	Enlist and define thermodynamic system.	A	1	
	d)	Enlist thermodynamic process.	A	1	
	e)	Define Enthalpy with its SI unit.	U	2	
	f)	State Hess's law.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Distinguish between reversible and irreversible process.	R	1	
	b)	Explain closed system and open system.	U	1	
	c)	Explain forms of energy and properties of energy.	A	1	
	d)	State the internal energy as a state property.	A	2	
	e)	Explain Heat capacity.	R	2	
	f)	State the SI units of following terms. 1. Entropy 2. Enthalpy 3.Internal Energy 4. Specific Heat	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain thermodynamic equilibrium.	U	1	
	b)	Derive the mathematical expression for Enthalpy.	A	2	
	c)	Explain Intensive and extensive properties.	R	1	
	d)	State the relation between Cp and Cv	A	2	
	e)	Prove Cv = dU/dT at constant volume	A	2	
	f)	Represent and explain the following processes on PV diagram 1. Isobaric and adiabatic.	R	1	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG402**

COURSE NAME **FOUNDRY TECHNOLOGY -II**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **11/ 12 / 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 **CEG 402**	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Raynould's law and its significance	R	1	
	b)	Why sprue is tapered towards the bottom?	A	1	
	c)	Define Modulus of casting	R	2	
	d)	Define 'Directional solidification'.	R	2	
	e)	Why sulphar is undesirable in S.G. iron manufacturing?	A	3	
	f)	State molding processes used in production of steel castings.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe converter method used in production of S.G. iron castings.	U	3	
	b)	Write the steps in designing of gating system.	A	1	
	c)	Explain Austempered Ductile Iron.	R	3	
	d)	Comment on riser shapes and its location. What is hot spot ?	U A	2	
	e)	State aids used for achieving directional solidification.	U	2	
	f)	State and explain Bernoullie's theorm. Write its importance in designing gating system.	R A	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain i) Chill test ii) Chvorinov's rule.	R	2-3	
	b)	Discuss Inoculation of Grey Cast Iron.	U	3	
	c)	Define gating ratio. Explain its types and write their applications.	R/ U	1	
	d)	Explain characteristics of steel castings.	R	3	
	e)	Explain Cain's method of riser size determination.	R	2	
	f)	Explain i) Carbon Equivalent (C.E.) ii) Law of continuity	U	1-2	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: Diploma in Metallurgical Engineering

COURSE CODE: - MTG402

COURSE NAME: - Foundry Technology II

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -11 /12/23

QN	SQN	SECTION –II	R/U/A	Co MTG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any two properties and uses of Al alloy casting.	U	4	02
	b)	Enlist various castable copper alloys.	A	4	02
	c)	Define casting defect. Write its classification.	R	5	02
	d)	Enlist dimensional casting defect.	A	5	02
	e)	State need of mechanization in foundry.	R	6	02
	f)	State advantages of energy saving in foundry.	U	6	02
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain casting property of copper alloys.	U	4	04
	b)	Explain causes & remedy of sand inclusion casting defect.	R	5	04
	c)	State reason of fluxing & degassing of Al melt.	U	4	04
	d)	State requirement of mechanization in molding unit.	R	6	04
	e)	State causes & remedy for distortion defect.	A	5	04
	f)	Enlist areas in foundry where energy saving possible with one suitable example.	R	6	04
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain effect of oxygen and hydrogen during copper melting.	U	4	04
	b)	Explain any one defect related to gas solubility in melt.	R	5	04
	c)	State various causes of dimensional casting defect.	R	5	04
	d)	What is hot tear? How it is eliminated.	A	5	04
	e)	State factor associate with energy saving in cupola furnace.	U	6	04
	f)	Define Mechanization. State drawbacks of Mechanization.	R	6	04

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM WINTER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG402**

COURSE NAME **FOUNDRY TECHNOLOGY -II**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **11/ 12 / 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 CEG 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Raynould's law and its significance	R	1	
	b)	Why sprue is tapered towards the bottom?	A	1	
	c)	Define Modulus of casting	R	2	
	d)	Define 'Directional solidification'.	R	2	
	e)	Why sulphar is undesirable in S.G. iron manufacturing?	A	3	
	f)	State molding processes used in production of steel castings.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe converter method used in production of S.G. iron castings.	U	3	
	b)	Write the steps in designing of gating system.	A	1	
	c)	Explain Austempered Ductile Iron.	R	3	
	d)	Comment on riser shapes and its location. What is hot spot ?	U A	2	
	e)	State aids used for achieving directional solidification.	U	2	
	f)	State and explain Bernoullie's theorm. Write its importance in designing gating system.	R A	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain i) Chill test ii) Chvorinov's rule.	R	2-3	
	b)	Discuss Inoculation of Grey Cast Iron.	U	3	
	c)	Define gating ratio. Explain its types and write their applications.	R/U	1	
	d)	Explain characteristics of steel castings.	R	3	
	e)	Explain Cain's method of riser size determination.	R	2	
	f)	Explain i) Carbon Equivalent (C.E.) ii) Law of continuity	U	1-2	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: Diploma in Metallurgical Engineering

COURSE CODE: - MTG402

COURSE NAME: - Foundry Technology II

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: -11 /12/23

QN	SQN	**SECTION –II**	R/U/A	Co MTG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any two properties and uses of Al alloy casting.	U	4	02
	b)	Enlist various castable copper alloys.	A	4	02
	c)	Define casting defect. Write its classification.	R	5	02
	d)	Enlist dimensional casting defect.	A	5	02
	e)	State need of mechanization in foundry.	R	6	02
	f)	State advantages of energy saving in foundry.	U	6	02
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain casting property of copper alloys.	U	4	04
	b)	Explain causes & remedy of sand inclusion casting defect.	R	5	04
	c)	State reason of fluxing & degassing of Al melt.	U	4	04
	d)	State requirement of mechanization in molding unit.	R	6	04
	e)	State causes & remedy for distortion defect.	A	5	04
	f)	Enlist areas in foundry where energy saving possible with one suitable example.	R	6	04
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain effect of oxygen and hydrogen during copper melting.	U	4	04
	b)	Explain any one defect related to gas solubility in melt.	R	5	04
	c)	State various causes of dimensional casting defect.	R	5	04
	d)	What is hot tear? How it is eliminated.	A	5	04
	e)	State factor associate with energy saving in cupola furnace.	U	6	04
	f)	Define Mechanization. State drawbacks of Mechanization.	R	6	04