GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG304**

COURSE NAME **IRON AND STEEL MAKING**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **25/ 06 / 2022**

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)	State the function of flux in iron making.	R	1	
	b)	Write the objective of sintering in iron making.	U	1	
	c)	Define sponge iron.	R	2	
	d)	State any four irregularities in blast furnace.	U	2	
	e)	Enlist various deoxidizers added during steel making.	A	3	
	f)	Write the present status of iron and steel industries in India?	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe the construction of hot blast stove.	R	2	
	b)	Explain basic steel making process.	U	3	
	c)	Draw a diagram of dust catcher. Explain it.	R	2	
	d)	Describe type of furnace refractories used in steel making process.	U	3	
	e)	List out different zones in blast furnace. Explain any two.	A	2	
	f)	Describe working principle and operation of blast furnace.	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain beneficiation of iron ore.	R	1	
	b)	Describe disc palletiser.	A	1	
	c)	Which type of coke is used in iron making? Sate its function.	R	1	
	d)	Explain the working of electrostatic precipitator.	U	2	
	e)	Write products of blast furnace. Explain any two.	U	2	
	f)	Differentiate between Acid and basic steel making.	R	3	

P.T.O.

Q.4		Attempt any **FOUR:**			**08**
	a)	State four advantages of electric arc furnace.	U	4	
	b)	State merits of open hearth furnace.	A	4	
	c)	List out various degassing techniques of steel.	R	5	
	d)	State advantage of AOD process.	U	5	
	e)	Explain merits of electric steel making.	A	4	
	f)	List out various types of continuous casting machine.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	With a neat and clean diagram of bessmer process showing all parts.	U	4	
	b)	Explain process of L.D. converter of steel making and write their merits.	R	4	
	c)	With labelled diagram and explain principle of electric arc furnace.	R	4	
	d)	Explain ladle furnace in secondary steel making.	R	5	
	e)	Describe any two vacuum degassing techniques of steel making.	A	5	
	f)	State any one process of continuous casting process.	R	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain principle, merits, demerits of induction furnace.	A	4	
	b)	With labelled diagram explain electric arc furnace with construction	R	4	
	c)	State Kaldo process of steel making and their principle.	U	4	
	d)	Explain ESR process in secondary steel making.	R	5	
	e)	Explain any one method of decarburization of steel in detail.	U	5	
	f)	Explain merits and demerits of continuous casting process.	A	6	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG303/MEF303**

COURSE NAME **METALLURGICAL ANALYSIS**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **24/ 06 / 2022**

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 303	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define sampling.	R	1	
	b)	List the important equipments used in chemical laboratory.	R	1	
	c)	Enlist various method of sampling.	R	1	
	d)	State the principle of Gravimetric Analysis.	R	2	
	e)	State solubility product rule.	R	2	
	f)	Define co-precipitation.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Compare Qualitative analysis with Quantitative analysis (4 points)	U	1	
	b)	Explain 'coning and quartering' method of sampling of ore.	U	1	
	c)	State the requirements for the precipitated form and weighed form.	R	2	
	d)	Enlist various types of error. State the causes and remedies for any one type of error.	R	1	
	e)	Explain the effect of excess precipitant on completeness of precipitation.	U	2	
	f)	Explain the meaning of accuracy and precision of a determination. If the precision of a determination is high, can it be assumed accurate.	U	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Write the process for sampling of molten metal.	U	1	
	b)	Describe the 'salt effect'.	U	2	
	c)	Explain the steps in filtration, drying and ignition in gravimetric analysis.	U	2	
	d)	Enlist different rules for handling the analytical balance.	R	2	
	e)	Compare gravimetric method of analysis with volumetric analysis (any four points)	A	2	
	f)	State the importance of calculations in Quantitative analysis.	R	1	

P.T.O.

Q.4		Attempt any **FOUR:**			**08**
	a)	Which indicators are the best for the rang 5-10 pH. Give their colour in acid and basic.	A	3	
	b)	State the principle of vacuum emission spectrometer.	U	4	
	c)	Enlist the strong acids, strong basic, and weak acids and weak basic.	A	3	
	d)	Enlist the types of titration in volumetric analysis.	R	3	
	e)	Define 'colorimetery'.	U	4	
	f)	Define 'Wavelength of spectrum'.	U	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain the merits and demerits of colorimeter.	U	4	
	b)	Explain the principle of volumetric analysis.	U	3	
	c)	Explain the strong acid and weak base titration. Draw the titration curve for it and which indicator is best for equivalence point and what is pH rang?	A	3	
	d)	State the merit and demerits of spectroscope/spectrometer.	U	4	
	e)	Write the procedure for Mg determination from iron. (analytical procedure)	A	5	
	f)	Explain the precipitation titration process with example.	U	3	
Q.6		Attempt any **FOUR:**			**16**
	a)	Suggest the method for determination of copper from the solution and explain the process.	A	4	
	b)	Explain the colorimeteric analysis.	R	4	
	c)	Explain the procedure for determination of Mg in S.G. iron by spectroscope.	A	5	
	d)	Explain the redox titration curve with example.	U	3	
	e)	Draw the neat sketches for i) Strong acid and strong base titration curve. ii) Strong base and weak acid titration curve.	A	3	
	f)	State the advantages of potentiometric analysis titration and enlist two indicators used for redox titration.	R	3	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG306/MEF306**

COURSE NAME **ELECTRICAL ENGINEERING AND ELECTRONICS**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **22/ 06 / 2022**

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

QN	SQN		R/U/A	Co MTG 306	Marks
Q.1		Attempt any **FOUR:**			08
	a)	Define i) Cycle ii) Frequency.	R	2	
	b)	State the use of following meters. i) Ammeter ii) voltmeter iii) Wattmeter iv) Megger.	U	2	
	c)	State the voltage and current relation in star and delta connection.	U	2	
	d)	Define power and power factor.	U	2	
	e)	State Ohm's law.	R	1	
	f)	List the applications of 3ϕ induction motor.	A	3	
Q.2		Attempt any **FOUR:**			16
	a)	State the effect of temperature on resistance.	U	1	
	b)	State the necessity of earthing and explain any one.	A	2	
	c)	With neat diagram explain capacitor. Start capacitor run 1ϕ induction motor.	A	3	
	d)	With neat diagram explain three phase 3 wire system.	U	2	
	e)	List the applications of shunt, series and compound d.c. motors.	A	3	
	f)	Derive the expression for resistance in series with circuit diagram.	A	1	
Q.3		Attempt any **FOUR:**			16
	a)	With neat diagram explain only the working principle of transformer with definition.	U	3	
	b)	Draw and explain working principle of 3ϕ induction motor.	U	3	
	c)	State and explain Faraday's Law of electromagnetic induction.	R	2	
	d)	List out the safety measures in electrical earthing.	U	2	
	e)	Define electrical energy with formula and unit.	R	2	
	f)	State the use of Resistance with circuit diagram.	U	1	

P.T.O.

QN	SQN		R/U/A	Co MTG 306	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw the symbol of resistor and inductor, capacitor and diode.	R	4	
	b)	Give applications of transducers. (any two)	R	5	
	c)	Define transducer. Give its two types.	U	5	
	d)	List types of electronic measuring instruments.	R	5	
	e)	Draw symbols of OR, EX-OR, NOR, NAND gates.	R	6	
	f)	Give truthtables of AND gate and NOT gate.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Draw and explain working principle of photodiode.	U	4	
	b)	Give classification of transducers.	R	5	
	c)	Convert $(10101)_2$ and $(1110)_2$ to Decimal number system.	A	6	
	d)	Draw and explain working principle of flow sensor.	U	5	
	e)	Explain working principle of P-N junction diode.	R	4	
	f)	Draw and explain working of disceplacement transducer.	U	5	
Q.6		Attempt any FOUR:			**16**
	a)	Draw and explain operation of relay and state its types.	A	4	
	b)	Explain temperature transducer in detail.	U	5	
	c)	Explain the working of Bourdon Tube.	U	5	
	d)	Substract the following numbers by using two's complement method $(10101)_2 - (0111)_2$.	A	6	
	e)	Enlist two applications of i) LCDs and ii) 7 segment displays.	A	4	
	f)	Enlist the different types of measuring instruments. Also give the applications of it (any two)	A	5	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **METALLURGY**

COURSE CODE :- **MTF502**

COURSE NAME **ENVIRONMENTAL PROTECTION IN METALLURGY INDUSTRIES**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **30/ 06 / 2022**

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 MTF 502	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Green House effect.	R	5	
	b)	Write about acid rain formation.	R	5	
	c)	Write types of ecosystem.	R	1	
	d)	Write names of harmful gases evolved when pouring cast iron.	U	1	
	e)	Write names of harmful gases evolved in foundries.	R	2	
	f)	Write air pollution sources from hot rolling mills.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write General characteristics of harmful waste gases evolved in foundries.	R	2	
	b)	Write about classification of Pollution and Pollutants.	R	1	
	c)	Write about ozone depletion.	U	5	
	d)	Write about waste gases evolved from pipe welding.	U	3	
	e)	Write about process and non process gases.	R	2	
	f)	Discuss photochemical Smog.	R	5	
Q.3		Attempt any **FOUR:**			**16**
	a)	What are the effects of gases evolved in steel industries?	R	3	
	b)	Explain air pollution in rolling mills.	R	3	
	c)	Discuss the Green House Effect.	U	5	
	d)	Explain the scrubber based system for oil/gas fired furnaces.	U	3	
	e)	Explain the major air pollutants in environment.	U	2	
	f)	Discuss the water pollution by foundries and remedies.	U	2	

P.T.O.

QN	SQN	SECTION –II	R/U/A	Co MTF 502	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define 'secondary treatment'.	R	6	
	b)	State the classification of solid waste.	R	7	
	c)	Define hazardous waste.	R	7	
	d)	Draw the sketch of land fill.	U	7	
	e)	Define thermal pollution.	R	8	
	f)	State any two causes of thermal pollution.	U	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain activated sludge treatment.	U	6	
	b)	Describe preliminary treatment.	U	6	
	c)	Explain about treatment ponds.	U	7	
	d)	Describe hazardous waste management.	U	7	
	e)	Explain the term phytoextraction in detail.	R	7	
	f)	Describe treatment and disposal of radioactive waste.	U	8	
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe disinfection method in waste water treatment.	U	6	
	b)	Define waste water treatment. State the necessity of it.	U	6	
	c)	Explain 3R.	R	7	
	d)	State sources and effects of radiation pollution.	U	8	
	e)	Define environmental audit. State benefits of it.	U	9	
	f)	Define EIA and explain the stages in EIA.	R	9	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTG 302/ MTF302**
COURSE NAME **MATERIAL TESTING**
MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **29/ 06 / 2022**

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

QN	SQN		R/U/A	Co MTG 302	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define stress.	U	1	02
	b)	Explain the relation between Tensile strength & hardness.	U	3	02
	c)	Write various types of indentors used in Rockwell hardness testing.	R	3	02
	d)	State the requirements of compression test.	R	2	02
	e)	Write the applications of Vicker's hardness testing.	R	3	02
	f)	State Hook's law.	U	1	02
Q.2		Attempt any **FOUR:**			**16**
	a)	Define 'strain'. Draw the graph of stress verses strain for mild steel.	R	1	04
	b)	Write the procedure to determine proof stress.	R	2	04
	c)	Draw stress strain graph for cast iron.	R	2	04
	d)	Explain poldi hardness test.	R	3	04
	e)	Explain the concept of shear stress and shear load.	U	1	04
	f)	Explain 'Poison's ratio'.	R	1	04
Q.3		Attempt any **TWO:**			**16**
	a)	Write steps followed to conduct Brinell hardness test. Also write its applications. (any four)	R	3	08
	b)	i) Define Young's Modulus. ii) Bulk Modulus and describe relation between Young's modulus and bulk modulus.	U	1	08
	c)	Describe compression test and its applications.	U	2	08
Q.4		Attempt any **FOUR:**			**08**
	a)	Give two application of creep test.	A	3	02
	b)	Define fatigue strength.	R	4	02
	c)	Enlist various test done during material testing	U	3	02
	d)	Draw various notches for charpy test.	A	4	02
	e)	What is endurance limit.	R	3	02
	f)	Define – Creep.	U	4	02

P.T.O.

Q.5		Attempt any **FOUR:**			**16**
	a)	Explain Izod impact test.	R	3	04
	b)	Explain factors to improve fatigue strength.	A	4	04
	c)	Explain hammer test for examination of defects.	U	4	04
	d)	Explain the penetration test in details.	R	4	04
	e)	Explain factors affecting the fatigue life.	U	3	04
	f)	What do you understand by the appearance of defects on radiography.	A	3	04
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain role of temperature & stress concentration factors on impact test.	A	3	04
	b)	Explain & draw creep curve & its interpretation.	A	4	04
	c)	State type of ultrasonic test & explain any one.	R	3	04
	d)	Describe the advantages & disadvantages of penetrant test.	R	4	04
	e)	Draw & explain S-N curve in fatigue test.	U	3	04
	f)	Explain the effect of grain size on creep strength.	U	4	04

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Q5(f) Write procedure for x-ray radiography test.

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**

COURSE CODE :- **MTF404**

COURSE NAME **POWDER METALLURGY**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **27/ 06 / 2022**

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 MTF 404	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define 'Powder Metallurgy'.	R	1	
	b)	Write steps involved in manufacturing of powder metallurgy component.	U	1	
	c)	Compare powder metallurgy method with other manufacturing process	A	1	
	d)	Write the special characteristics obtained by powder metallurgy part.	U	1	
	e)	Write classification of powder manufacturing methods.	R	2	
	f)	Draw diagram of ball mill.	R	2	
	g)	Draw flow sheet/flow chart for production of sponge iron powder by Hoeganeous process.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	State advantages of powder metallurgy.	A	1	
	b)	Describe the mechanism of milling process for manufacturing of powders.	U	2	
	c)	State advantages of electrolytic reduction.	A	2	
	d)	Explain with diagram water Atomization process.	U	2	
	e)	Define Apparent Density and write the method for measurement of apparent density.	R	3	
	f)	Describe powder sampling techniques with diagrams.	R	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Write any four applications of powder metallurgy.	A	1	
	b)	Draw and explain flow diagram for carbonyl process for powder production of iron.	U	2	
	c)	State advantages of Atomization process.	U	2	
	d)	Explain with schematic diagram inert gas Atomization process.	U	2	
	e)	Describe various shapes of powder particles and explain how different shapes affect the properties of powders.	R	3	
	f)	Explain Sedimentation process for particle size measurement.	R	3	

P.T.O.

QN	SQN	SECTION -II	R/U/A	Co MTF 404	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define 'pressureless shaping compaction Technique'.	R	4	
	b)	State the role of lubrication in compaction of powder.	R	4	
	c)	State the purpose of sintering.	R	5	
	d)	Enlist the stages of sintering.	R	5	
	e)	Mention the characteristics of porous bearing.	R	6	
	f)	Enlist the steps in manufacturing of sintered friction materials.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe cyclic compaction technique with sketch. State any two products obtained by it.	U	4	
	b)	Illustrate powder extrusion with neat sketch. State products obtained by it.	A	4	
	c)	State the advantages and short comings of cold Isostatic pressing.	R	4	
	d)	Describe powder Rolling with diagram. State its advantages.	U	4	
	e)	Enlist various die compaction techniques and explain any one with diagram.	U	4	
	f)	Enumerate tools and equipments used for die compaction. State advantages of hydraulic press over mechanical press.	R	4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Define 'sintering'. Describe stages of solid state sintering.	U	5	
	b)	Describe following sintering mechanism i) Surface diffusion ii) Grain boundary diffusion mechanism.	U	5	
	c)	State the functions of sintering atmosphere. What are various types of sintering atmosphere, give example of each?	A	6	
	d)	Illustrate method of production of porous bearing.	A	6	
	e)	Discuss the applications of sintered friction materials.	A	6	
	f)	Define Tool material. Illustrate properties and application of cemented carbides.	A	6	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTG 305**
COURSE NAME **Foundry Technology - I**
MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **27/ 06 / 2022**

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 MTE 403	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write the applications of shell moulding process?	A	4	02
	b)	List out pattern lifting devices.	A	2	02
	c)	Define the term "Binder"? State the types of Binder.	U	3	02
	d)	State the importance of Foundry Technology.	U	1	02
	e)	Write the importance of mould castings.	R	4	02
	f)	Define the term 'Pattern' State its uses.	A	2	02
Q.2		Attempt any **FOUR:**			**16**
	a)	State the functions of core. Write its significance.	U	3	04
	b)	Define i) Core Venting ii) Core baking iii) Core dressing iv) Mould wash	U	4	04
	c)	Enlist various types of pattern. Explain any two with neat sketches.	U	2	04
	d)	State the properties required in sand used for molding. Explain any two.	R	3	04
	e)	With neat diagram explain principle and operation of shell molding process.	A	4	04
	f)	State the factors considered in pattern design.	A	2	04
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain method of permibility testing of sand.	R	3	04
	b)	Draw a neat sketch showing different sections in foundry.	R	1	04
	c)	Explain in details pattern making tools and machines with diagram.	U	2	04
	d)	Write advantages and disadvantages of CO_2 molding process.	U	4	04
	e)	Write applications of core.	A	3	04
	f)	State function of pattern.	U	2	04

QN	SQN		R/U/A	Co MTF 403	Marks
Q.4		**Answer any FOUR:**			**08**
	a)	State the principle of gravity die casting.	R	5	02
	b)	Why investment casting is called Precision casting process.	U	5	02
	c)	Define 'calorific value' of coke.	R	6	02
	d)	Enlist types of cupola furnace.	R	6	02
	e)	State the purpose of fettling of castings.	R	7	02
	f)	Mention the types of abrasives used for blasting of castings.	R	7	02
Q.5		**Answer any FOUR:**			**16**
	a)	Draw a neat labelled diagram of a cold chamber die casting machine.	U	5	04
	b)	Explain the principle and working of true centrifugal casting process.	U	5	04
	c)	Difference between pit and floor molding.	U	5	04
	d)	Describe the construction of cupola furnace.	U	6	04
	e)	Enlist different fluxing agents in cupola with their chemical compositions. Explain their role in cupola.	U	6	04
	f)	Suggest a molding process for casting of piston rings. Justify your answer.	A	7	04
Q.6		**Answer any FOUR:**			**16**
	a)	Enlist the types of castings manufactured by continuous casting process. Explain the working of process.	U	5	04
	b)	State advantages and limitations of hot chamber die casting method.	U	5	04
	c)	Explain the importance and procedure for dewaxing in investment casting.	U	5	04
	d)	Describe ceramic molding with its principle, working, advantages and applications.	U	5	04
	e)	Explain the stages in preparation of cupola furnace.	U	6	04
	f)	Explain the purpose and working of chipping of castings.	U	7	04

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						

LEVEL: -**FOURTH** PROGRAM: **METALLURGY**
COURSE CODE: - **MTG401/MTF401**
COURSE NAME: - **PHYSICAL METALLURGY II**
MAX. MARKS: **80** TIMES: **3Hrs.45 Min.** DATE: - **06/07/2022**

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 401	Marks
Q.1		Attempt any **FOUR :**			**08**
	a)	Write names of two types of bainite.	R	1	
	b)	Define 'Austenite'.	R	1	
	c)	Define 'M_s' and 'M_f' temperature.	R	1	
	d)	Write any two critical points with temperature.	A	1	
	e)	List various types of annealing process.	A	2	
	f)	Define 'Box annealing'.	U	2	
Q.2		Attempt any **FOUR :**			**16**
	a)	Explain T.T.T. diagram for eutectoid steel.	U	1	
	b)	Explain mechanism of transformation of pearlite to austenite on slow heating.	U	1	
	c)	Describe conventional hardening process for steel.	R	3	
	d)	Define Quenching Media. Write various commonly used quenching media.	A/R	3	
	e)	Explain secondary hardening for steels.	U	4	
	f)	Describe microstructure change in low and medium temperature tempering.	U	4	
Q.3		Attempt any **FOUR**			**16**
	a)	Write difference between time temperature transformation (TTT) diagram and continuous cooling transformation (CCT) diagram.	A	1	
	b)	Describe characteristics of martensitic transformation.	U	1	
	c)	Differentiate between Annealing and Normalizing.	A	2	
	d)	Explain any one quenching media used for quenching.	A/U	3	
	e)	State reason why Hyper – eutectoid steels are not hardened from above Acm temperature.	R	3	

P.T.O.

QN	SQN	SECTION - II	R/U/A	Co MTG 401	Marks
Q.4		Attempt any **FOUR** :			08
	a)	Enlist various hardenability test.	R	5	
	b)	Draw standard specimen of Jominy end quench test.	R	5	
	c)	Write advantages of gas carburizing.	R	6	
	d)	Write principle of Nitriding.	U	6	
	e)	Name heat treatment given to white CI.	R	8	
	f)	Write precautions to be taken in heat treatment shop.	R	10	
Q.5		Attempt any **FOUR** :			**16**
	a)	Explain process of laser hardening process. Write any two advantages and limitations.	R	7	
	b)	Distinguish between Nirtiding and carbonitriding.	R	6	
	c)	Explain the heat treatment of SG iron. Write properties achieved after heat treatment.	R	8	
	d)	Explain precipitation hardening of AL-Cu system.	U	9	
	e)	Define hardenability. Explain Jominy End Quench test method.	U	5	
	f)	State factors affecting hardenability.	R	6	
Q.6		Attempt any **TWO** :			**16**
	a)	Explain principle of carburizing. Describe pack carburizing process in details.	U	6	
	b)	Explain electrolytic bath hardening process.	A	5	
	c)	List various heat treatment done on Aluminum. Explain any one heat treatment.	A	6	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**

COURSE CODE :- **MTF406**

COURSE NAME **METAL JOINING AND METAL FORMING PROCESSES**

MAX. MARKS : **80** TIME : **03Hrs.45 min.** DATE :- **04/ 07 / 2022**

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 MTF 406	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	List various metal joining processes. State two uses of soldering.	U	1	
	b)	State classification of welding process.	U	1	
	c)	What is 'Metallurgical Fusion'?	R	1	
	d)	List various flam associate with O_2-C_2H_2 Gas welding.	R	2	
	e)	State role of outer flame and inner cone (flame) of O_2-C_2H_2 gas welding	U	2	
	f)	State necessity of flux during Gas welding.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw and label different part in O_2-C_2H_2 Gas welding equipment.	U	2	
	b)	Draw a reducing flame. How it is produced. Why it is called 'carborising flame'?	U	2	
	c)	List various fuel Gases used in Gas welding. State role of acetone in C_2H_2-O_2 welding.	U	2	
	d)	Compare leftward technique with Rightward technique.	U	2	
	e)	Explain Arc deflection and Arc strike.	U	3	
	f)	Describe suitable polarity used for welding of thick plates, with neat sketch.	A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain working and uses of submerged Arc welding.	A	3	
	b)	Draw setup of shield metal inert Gas Arc welding. State function of each component.	U	3	
	c)	Write principle and uses of Electron beam welding process.	U/A	4	
	d)	State principle, two advantages and uses of Resistance welding.	A	4	
	e)	Describe, principle advantages and uses of Thermitt Welding.	A	4	
	f)	Explain principle of bond formation in Explosion Welding. State role of buffer plate.	R/U	4	

P.T.O.

QN	SQN	SECTION –II	R/U/A	Co MTF 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw structure of any four types of weld Joints.	U	5	
	b)	Define H.A.Z.	R	5	
	c)	Write types of fluxes used for soldering.	U	1	
	d)	Enlist commonly used non-destructive testing methods to test weld portion.	A	7	
	e)	State causes and remedies for weld crack.	A	7	
	f)	Write application of Electro chemical machining.	A	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain per and post heat treatments of weld joint.	U	5	
	b)	Describe various zones of weld joint.	U	5	
	c)	Distinguish between soldering and brazing.	U	1	
	d)	Explain dye Penetrant test for testing weld joint.	U	7	
	e)	Write advantages of Electro discharge machining.	R	8	
	f)	Define 'Powder forging'. State its four advantages and disadvantages.	R	8	
Q.6		Attempt any **FOUR:**			**16**
	a)	Enlist various types of weld joints. Explain two types of weld joints in details.	R/U	5	
	b)	Write applications of Soldering and Brazing.	A	1	
	c)	State function of fluxes used for soldering.	U	1	
	d)	State causes and remedies for : i) Blow holes and porosity ii) Incomplete fusion.	U	7	
	e)	Describe process of EDM. (Electro Discharge Machining)	U	8	
	f)	Write characteristics of powder forging.	U	8	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM June-July-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**

COURSE CODE :- **MTG402 / MTF402**

COURSE NAME **FOUNDRY TECHNOLOGY -II**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **02/07/ 2022**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

QN	S N	**Section- I**	R/ U/ A	Co MTG 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the equation of continuity with its significance.	R	1	02
	b)	Define carbon equivalent (CE). Write its significance.	U	3	02
	c)	State functions of riser.	R	2	02
	d)	State Mg recovery in SG iron castings. State its importance.	U	3	02
	e)	Write the types of gating ratios with examples.	R	1	02
	f)	State Chrorinov's rule.	R	2	02
Q.2		Attempt any **FOUR:**			**16**
	a)	State and explain elements of gating system.	R	1	04
	b)	Explain the types of risers.	R	2	04
	c)	Explain Inoculation of Grey cast iron.	U	3	04
	d)	Explain the characteristics of steel castings.	R	3	04
	e)	Describe sandwich method of S.G. iron manufacturing.	U	3	04
	f)	State and explain Bernoullie's theorem.	R	1	04
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain i) Raynould's no. ii) Cain's method.	R	2	04
	b)	Enlist the requirements of good gating system.	R	1	04
	c)	Differentiate between progressive and directional solidification.	U	2	04
	d)	What care to be taken while using chills in the manufacturing of casting.	A	2	04
	e)	Explain Inscribed circle method of designing risers.	U	2	04
	f)	Enlist molding and core making processes used in Gray C.I. & S.G. iron castings.	A	3	04

P.T.O.

QN	S QN	Section- II	R/ U/ A	Co MTG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write two properties and uses of aluminium alloy casting.	A	5	02
	b)	Explain furnace operating practices for energy saving in foundries.	A	5	02
	c)	Write moulding methods used for Cu-alloy castings.	A	6	02
	d)	What is high pressure molding line.	R	6	02
	e)	What is swelling of casting? How is it eliminated.	R	7	02
	f)	List only defects associated with surface of casting.	U	7	02
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain the areas of mechanization in foundries.	U	5	04
	b)	Why fluxing and degassing is necessary for Al-melt.	R	5	04
	c)	Explain appearance & causes of scabbing in castings.	A	5	04
	d)	Explain various difficulties during copper melting.	U	6	04
	e)	Explain need for reclamation of green sand.	A	6	04
	f)	What is cold crack. State causes.	U	7	04
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain effect of hydrogen on Cu-melt.	U	7	04
	b)	Explain mismatch in terms of causes and its remedial action.	R	7	04
	c)	Describe grain refinement applied for Al alloy castings.	U	7	04
	d)	State classification of casting defects. State various causes of discontinuity type defect.	U	7	04
	e)	Explain various sources of gas porosity defect. Suggest action to reduce porosity in Al-casting.	A	8	04
	f)	Explain the gating used for Mg alloy castings.	A	8	04

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG310/MTE401**

COURSE NAME **METAL WORKING PROCESSES**

MAX. MARKS : **80** TIME : **03Hrs.45 min.** DATE :- **13/ 07 / 2022**

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)	Define metal forming process.	R	1	
	b)	Define cold working operations of metals.	R	1	
	c)	Enlist any four products of rolling of metals.	U	2	
	d)	State the principle of rolling process.	U	2	
	e)	Enlist the size ranges of finished products of wire drawing.	U	3	
	f)	State the roles of lubricants used for wire drawing process.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain cold working and hot working of metals. Give two examples of each	U	1	
	b)	Write classification of metal forming processes.	A	1	
	c)	With a neat labelled diagram, explain the working of planetary rolling mill.	U	2	
	d)	Explain a suitable rolling method for manufacturing I-section beams.	A	2	
	e)	Explain the terms :- i) Arc of contact ii) Angle of bite iii) Deformation zone. With a neat labelled roll geometry diagram.	U	2	
	f)	Differentiate between sink drawing and tube drawing processes.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Select the appropriate heat treatment for high C steel wire, for restoring their ductility during drawing.	A	3	
	b)	Describe any two wire drawing defects with their causes and remedies.	U	3	
	c)	Explain the working of Draw bench.	U	3	
	d)	Derive the expression for Roll bite condition.	U	2	
	e)	State the causes and remedies for i) Non uniform thickness ii) Edging of rolled products.	U	2	
	f)	State the advantages for preheating of steels for forming processes.	U	1	

P.T.O

Q.4		Attempt any **FOUR:**			**08**
	a)	Define 'Forging'.	R	4	
	b)	Name four hand forging operation and explain any one.	R	4	
	c)	Write raw materials used for forging.	U	4	
	d)	Define 'Hammer Forging'.	R	4	
	e)	Define Extrusion Ratio and Extrusion Pressure.	U	5	
	f)	Explain principle of Bending and Deep drawing.	U	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain with a neat diagram working of Hydraulic Presses.	U	4	
	b)	State causes and remedies of defects in forging i) Cold Shut ii) Flash	A	4	
	c)	Differentiate between Indirect Extrusion and Direction Extrusion.	U	5	
	d)	Explain 'Impact Extrusion'. Write applications of Impact Extrusion.	R A	5	
	e)	Describe spring back effect occurred.	U	6	
	f)	Explain following cutting operation. i) Shearing ii) Piercing iii) Blanking iv) Shaving.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the principle of working of mechanical press with simples sketch.	R/ U	4	
	b)	Explain forging operations i) Fullering ii) Upsetting	A	4	
	c)	Describe various mandrels used for extrusion.	U	5	
	d)	State causes and remedies for internal pipe defect in extrusion.	A	5	
	e)	Explain rubber pad bending.	U	6	
	f)	Explain the significance of clearance between die and punch.	U	6	

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EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						

LEVEL: -**THIRD** PROGRAM: **METALLURY**
COURSE CODE: - **MTG312/MTF304**
COURSE NAME: - **EXTRACTION OF NON FERROUS METALS**
MAX. MARKS: **80** TIMES: **3Hrs.45 Min.** DATE: - **09/07/2022**

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 Ore, Mineral	R	1	
	b)	Define roasting. State types of roasting.	R	1	
	c)	State various ores of copper.	R	2	
	d)	Write properties of Titanium.	R	3	
	e)	State ores ad minerals of Lithium.	R	3	
	f)	State the sequential operations in hydrometallurgy of copper.	R	1	
Q.2		Attempt any **FOUR :**			**16**
	a)	Describe electrolytic refining of copper.	U	2	
	b)	Explain pyro metallurgical methods of extraction.	U	2	
	c)	Explain the process of making blister copper.	U	2	
	d)	Define Ore dressing. Write its classification.	U	1	
	e)	Explain role of magnesium in extracting Ti.	A	3	
	f)	Explain preparation of lithium metal by electrolysis.	U	3	
Q.3		Attempt any **TWO .**			**16**
	a)	Draw a flow chart of copper extraction by pyrometallurgical process.	U	2	
	b)	Differentiate between pyrometallurgy and hydrometallurgy.	U/A	1	
	c)	Describe Kroll's process used for extraction of titanium. Explain properties and applications of lithium.	U/A	3	
Q.4		Attempt any **FOUR :**			08
	a)	State any two ores / minerals of zinc.	R	4	
	b)	Write application of aluminium in automobile industry?	A	5	
	c)	Name two refining methods for aluminium.	R	5	
	d)	Write the factors affecting Bayer's process?	U	5	
	e)	Name the ores and minerals of Aluminium.	R	5	
	f)	State the applications of zinc.	R	4	

P.T.O.

Q.5		Attempt any **FOUR** :			**16**
	a)	Explain the need for roasting zinc of concentrates.	U	4	
	b)	Draw and explain Bayer's flow chart for Aliminium.	U	5	
	c)	Explain the reactions involved in cryolite preparation.	U	5	
	d)	Explain any one method for gold extraction?	A	6	
	e)	Explain method for production of tungsten powder.	U	6	
	f)	Draw a flow chart of pyrometallurgical extraction of zinc.	U	4	
Q.6		Attempt any **TWO** :			**16**
	a)	Explain refining of zinc by liquidation and Redistillation method.	U	4	
	b)	Explain refining of Aluminium by Electrolytic process, State its two advantages.	U	5	
	c)	Explain process for production of ductile tungsten write its applications. (Any two)	U/ A	6	

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **FORTH** PROGRAM : **METALLURGY**

COURSE CODE :- **MTF403**

COURSE NAME **FAILURE ANALYSIS AND SELECTION OF MATERIAL**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **23/ 06 / 2022**

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 MTF 403	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define 'critical size'?	R	2	
	b)	Define erosion?	R	2	
	c)	Enlist nondestructive methods for detection of flaw.	R	2	
	d)	Write different types of fractures for failures.	R	2	
	e)	Define fatigue strength of material.	R	2	
	f)	Write the causes of mechanical failure.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain mechanical and chemical stressors.	U	1	
	b)	Explain various types of loading.	U	2	
	c)	Discuss bending fracture and its effects on failure of material.	U	2	
	d)	Describe Ductile to brittle transition in steel.	U	2	
	e)	Describe plain strain fracture.	U	4	
	f)	Explain Intergranular corrosion in details.	U	4	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain various steps in investigation of failure.	A	4	
	b)	What is stress corrosion cracking? Explain.	A	4	
	c)	Write general aspect of non destructive testing. Illustrate radiographic technique applied in welding.	A	4	
	d)	Illustrate KIC fracture toughness. How it is measured and why fracture toughness is important.	R	4	
	e)	Describe detailed prevention of corrosion failure and simplify each step.	A	4	
	f)	Describe details of De alloying.	U	4	

P.T.O.

QN	SQN	Section- II	R/ U/ A	Co MTF 403	Marks
Q.4		**Answer any FOUR:**			**08**
	a)	Define weldability.	R	5	
	b)	Define soft magnets.	R	6	
	c)	Write the difference between alloy steels & tool steels.	U	6	
	d)	Explain creep in metals?	R	5	
	e)	Define high speed steels?	R	6	
	f)	Write the chemical composition & applications of Duraluminium alloy.	R	6	
Q.5		**Answer any FOUR:**			**16**
	a)	Explain the damage to metals & alloys by loss of strength at high temperature.	U	5	
	b)	Define Machinability. Write the factors influencing on it.	U	6	
	c)	Describe the weighted property index method of material selection.	U	5	
	d)	Explain the sensitization of 18-8 stainless steel.	U	6	
	e)	Suggest suitable materials for following components & justify your selection i) Surgical tools. ii) Jet engine turbines.	A	6	
	f)	Write chemical composition & Applications of following materials. i) Invar ii) Alnico	A	6	
Q.6		**Answer any FOUR:**			**16**
	a)	Describe three stages of creep.	U	6	
	b)	Explain the classification of tool steel on the basis of their applications.	U	6	
	c)	Write the requirements for steels to be used for cutting tools.	A	6	
	d)	Enlist various types of wear. Describe any one type in detail.	U	6	
	e)	Write chemical composition & applications of following materials. i) Haste alloy. ii) Martensitic stainless steel	A	6	
	f)	Suggest suitable materials for following components & Justify your selection i) Cylinder block ii) Connecting rod	A	6	

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