GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : Metallurgical Engineering

COURSE CODE :- MTG 308 / MTF308

COURSE NAME :- Mechanical Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 21/ 5/ 2024

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:**		MTG 308	**08**
	a)	Define heat transfer	R	MTG 308- 4	
	b)	Functions of IC engine :-i) Cylinder ii) Connecting Rod	A	MTG 308- 3	
	c)	Draw convectional representation of offset section	R	MTG 308- 2	
	d)	Define radiation with example	R	MTG 308- 4	
	e)	Draw the convectional representation of pulley	U	MTG 308- 2	
	f)	Give the names of strokes in 4 stroke petrol engine	R	MTG 308- 3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write the detail classification of IC Engine	R	MTG 308- 3	
	b)	What is insulation & explain different types of insulation	U	MTG 308- 4	
	c)	Draw sectional view of flywheel	U	MTG 308- 2	
	d)	Explain the concept of black body	U	MTG 308- 4	
	e)	Describe working principle of petrol engine with neat sketch	A	MTG 308- 3	
	f)	Draw a neat sketch of engine body showing various parts	R	MTG 308- 1	
Q.3		Attempt any **two:**			**16**
	a)	Draw sectional orthographic view of :- i) Pump Body ii) Crank Shaft	R	MTG 308- 1	
	b)	Differentiate between two stroke and four stroke engine	U	MTG 308- 3	
	c)	A steel pipe of inner and outer dia 6mm & 8mm resp has inside temp 150 degree Celsius and outside temp 40 degree Celsius. The thermal conductivity of steel is 24 W/mK. Calculate the rate of heat transfer this pipe if transfer of the pipe is 1.5m	U	MTG 308- 4	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - THREE PROGRAM : **Metallurgy**

COURSE CODE :- MTG308 / MTF308

COURSE NAME :- Mechanical enginnering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 21/5/2024

QN	SQN	Question Text	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write different types of fluids.	R	5	
	b)	Write Newton's law of viscosity.	R	5	
	c)	Write different materials used for belts in belt drive.	U	6	
	d)	Write applications of pneumatic system	U	8	
	e)	What is mean by FRL unit.	R	8	
	f)	Explain different pressure control elements used in Hydraulic and pneumatics.	U	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain the term surface tension & specific volume	R	5	
	b)	A plate 0.025 mm distant from fixed plate, moves at 60 cm/s and requires a force of 2 N per unit area i.e., 2 N/m^2 to maintain this speed. Determine fluid viscosity between the plates.	A	5	
	c)	What are the different types of gears used in machines.	R	6	
	d)	Derive an expression for velocity ratio of flat belt drive.	A	6	
	e)	Classify different types of compressors and explain anyone	R	7	
	f)	Dra symbols of:- i) check valve ii) filter iii) control valve iv) cylinder	R	8	
Q.6		Attempt any **FOUR:**			**16**
	a)	Define the following i)Specific weight ii)Specific Gravity	R	5	
	b)	Explain gear drive & give its applications	U	6	
	c)	Write advantages and disadvantages of chain drive.	R	6	
	d)	Explain working of Centrifugal pump with neat sketch.	U	7	
	e)	Write different applications of pumps and compressors.	U	7	
	f)	What are the different types of flow control valves used in Hydraulics.	U	8	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Three PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG302 / MTF302

COURSE NAME :- MATERIAL TESTING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 20/5/2024

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 302	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Elasticity and Plasticity	R	1	
	b)	Draw a neat diagram of tensile test bar and explain it properly	R	2	
	c)	Define Young's Modulus	R	1	
	d)	Define bulk modulus	U	1	
	e)	State different types of hardness testing Machine	R	3	
	f)	Define Poission's Ratio	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write any two types of stresses in detail	R	1	
	b)	Explain engineering stress and engineering strain.	U	1	
	c)	Explain proof stress and its necessity.	U	2	
	d)	Draw stress strain curve name it properly. Define the points on the curve.	R	2	
	e)	Explain the procedure of Rockwell Hardness Testing with its advantages and disadvantages	U	3	
	f)	Explain scratch hardenss test and wear hardenss test	R	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between resiliance and toughness.	U	1	
	b)	Define shear load and shear stress	R	1	
	c)	Explain the parameters affecting tensile testing of a material.	U	2	
	d)	Differentiate between Engineering stress strain curve and true strain curve.	R	2	
	e)	Expalin the process of Poldi Hardness testing	R	3	
	f)	Explain advantages of Rockwell hardenss testing compare to other hardness testing .	U	3	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTG 302	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Enlist various Impact Test.	R	4	
	b)	Define term Impact Test. Why notch given on specimen before impact test.	R	4	
	c)	Draw SN curve for ferrous alloy.	U	5	
	d)	Define term 'creep'.	R	5	
	e)	Draw Intergranular creep fracture.	U	6	
	f)	State two advantages and disadvantages of Visual Inspection Method.	U	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain mechanism of fatigue failure.	U	5	
	b)	Draw and explain creep curve showing stages of creep.	R	6	
	c)	Define term 'creep strength'. Explain concept of 'secondary creep'.	U	6	
	d)	Enlist various NDT method. State two advantages of NDT method over Destructive (DT) method.	A U	7	
	e)	Explain procedure to detect surface crack using Dye Penetrant Test.	U	7	
	f)	Enlist a nondestructive test used to inspect Internal flows. State sources of energy used Radiography.	U	7	
Q.6		Attempt any **TWO:**			**16**
	a)	Explain principle, and procedure of magnetic particle Inspection Test. State reason. Why test fails when crack is in same direction of magnetic lines?	U	7	
	b)	Explain principle and procedure of rotating Beam Fatigue testing machine. Write methods adopted for improvement of fatigue strength.	U	5	
	c)	Explain principle and procedure to conduct Charpy Impact Test. Distinguish between Charpy Impact Test and Izod Impact Test.	U	4	

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGICAl ENGINEERING**

COURSE CODE :- **MTG306 / MTE306**

COURSE NAME **ELECTRICAL ENGINEERING & ELECTRONICS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **18/ 05 / 2024**

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 306	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Find the equivalent resistance of two 10Ω resistors if they are connected in i) Series ii) Parallel.	A	1	
	b)	State Faraday's Second Law of Electromagnetic induction. Write its mathematical equation.	U	2	
	c)	Draw three phase 3-wire system and three phase 4-wire system.	R	2	
	d)	Suggest type of instrument required to measure following unknown quantities. i) AC voltage ii) DC voltage iii) DC power iv) Insulation resistance.	A	2	
	e)	State function of transformer.	R	3	
	f)	State any Four applications of squirrel cage induction motor.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	An electric Kettle has a resistance of 30Ω. What current will flow when it is connected to a 240V supply? Find also the power rating of Kettle.	A	1	
	b)	In the circuit shown below Fig. (a), the voltage across resistor R_1 is equal to 4V and Resistor R_2 is equal to 6 volt. Determine total current passing through circuit and also find value of resistance R_2.	A	2	
	c)	Define the terms ; - i) Average value ii) Maximum value iii) RMS value iv) Instantaneous value.	R	2	
	d)	With neat sketch explain generation of three phase voltage.	U	2	
	e)	Compare PMMC and MI type of instrument.	U	2	
	f)	With neat sketch explain working principle of Shaded pole induction motor.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Compare series circuit and parallel circuit.	R	1	
	b)	Discuss the effect of temperature on resistance.	U	1	
	c)	Draw star and delta networks. Also define balanced load and unbalanced load.	R	2	

	d)	State types of earthing. List the any two advantages of earthing. Name some of equipments for which earthing is necessary.	R	2	
	e)	Draw and explain working principle of capacitor start capacitor run motor.	U	3	
	f)	Explain concept of revolving magnetic field with neat vector diagrams.	U	3	

2 b]

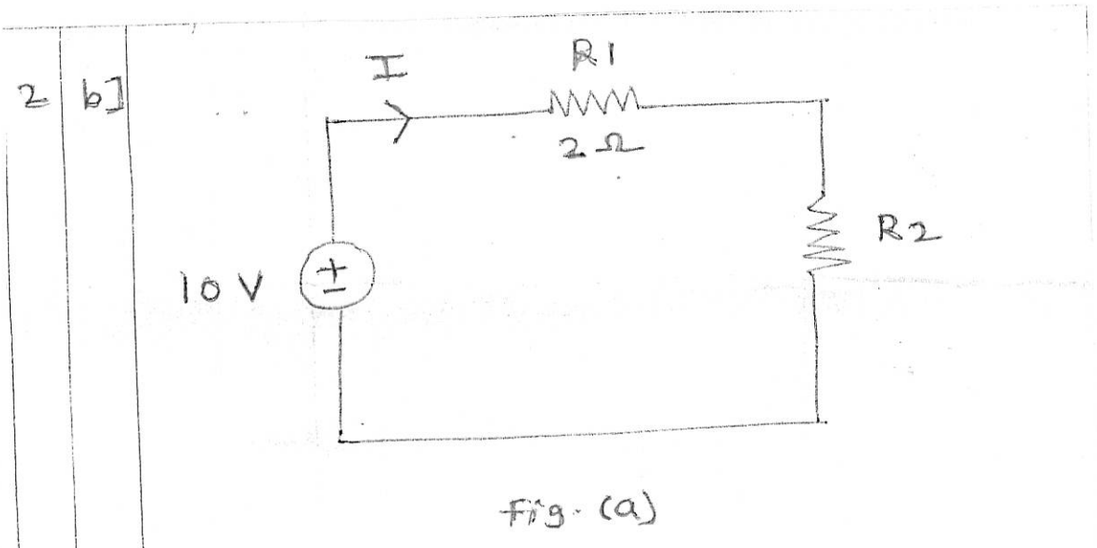

Fig. (a)

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : Metallurgy

COURSE CODE : MTG 306 / MTE306

COURSE NAME : Electrical engineering and electronics

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- 18/5/2024

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 306	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define transducer.	R	5	
	b)	Draw symbol of inductor and capacitor. Also give their units.	R	4	
	c)	Enlist different types of temperature transducers.	R	5	
	d)	Draw pin diagram of 2 Input AND gate IC.	R	6	
	e)	Classify transducers.	U	5	
	f)	Give truth table of 2 Input OR gate.	A	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw and explain input characteristics of diode.	U	4	
	b)	Explain working principle of capacitive transducer.	U	5	
	c)	Convert decimal number into it's equivalent binary number 1) 105 2)204	V	6	
	d)	Enlist factors to be considered while selecting a transducer (any 4)	U	5	
	e)	Explain photodiode.	U	4	
	f)	Explain working of ~~bellows~~. Pressure sensor.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Draw and explain output characterisites of BJT.	U	4	
	b)	Explain working principle of RTD.	U	5	
	c)	Convert 1011.01 binary number into it's equivalent Hexa decimal number.	C	6	
	d)	Draw symbol of LDR. Explain its working principle.	U	4	
	e)	Explain working of thermocouple.	U	5	
	f)	Explain with neat diagram, ~~Burdon tube~~ . any one flow sensor.	U	5	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Third PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTH301

COURSE NAME :- Basic Metallurgy

MAX. MARKS : 70 TIME : **03 Hrs** DATE :- 18/5/2024

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 **THREE: (2 X 3)**			**06**
	a)	Define polymorphism.	R	1	
	b)	Write down various types of crystal structures with an example.	R	1	
	c)	Define recrystallization.	R	2	
	d)	Give the classification of fuels with an example.	R	3	
	e)	Write down two uses of pulverized coke.	A	3	
Q.2		Attempt any **FOUR: (4 X 4)**			**16**
	a)	Explain point and line imperfections in crystal with diagram.	U	1	
	b)	Calculate average number of atoms per unit cell for simple cubic and face centered cubic structure.	A	1	
	c)	Compare cold working with hot working. (Four Points)	U	2	
	d)	Describe proximate analysis of coal.	R	3	
	e)	Describe carbonization of coal.	R	3	
	f)	Explain the selection criteria of fuel for particular application.	U	3	
Q.3		Attempt any **TWO: (6 X 2)**			**12**
	a)	Define atomic packing factor. Calculate it for BCC structure.	R	1	
	b)	Draw stress-strain curve. Explain its importance in metallurgy. Enlist the properties determine by stress-strain curve.	A	2	
	c)	State properties, advantages, limitations and applications of solid fuels.	A	3	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Third PROGRAM : METALLURGY

COURSE CODE :- MTH-301

COURSE NAME :- BASIC METALLURGY

MAX. MARKS : 70 TIME : **03 Hrs** DATE :-18/5/2024

QN	SQN	Question Text	R/U/A	Co MTH 301	Marks
Q.4		Attempt any **FOUR: (2 X 4)**			**08**
	a)	Write at least four characteristics of ideal gasoline.	R	4	
	b)	What is natural gas?	A	4	
	c)	Define refractoriness	A	5	
	d)	Mention four requirements of a thermocouple	U	5	
	e)	Draw a neat block diagram showing manufacturing of refactory.	R	6	
	f)	Define Pyrometer. Enlist its types.	R	6	
Q.5		Attempt any **FOUR: (4 X 4)**			**16**
	a)	Explain construction and working of Disappearing Filament optical Pyrometer along with a neat diagram.	A	4	
	b)	What is Pit Furnace? Explain its working with neat diagram.	U	4	
	c)	Why is Hydrogen called as a 'Future Fuel'?	A	6	
	d)	Write a note on CNG. (composition,properties,uses)	A	5	
	e)	Explain PCE Test for refractory material	A	5	
	f)	Enlist different properties of refractory material.Elaborate any 2 in detail	U	6	
Q.6		Attempt any **TWO: (6 X 2)**			**12**
	a)	Elaborate following effects observed in thermocouple a. Seeback Effect b. Peltier Effect.	U	4	
	b)	Write principle of Bunsen burner. Draw a neat sketch of setup and explain various types of flames observed.	R	5	
	c)	Explain following refractories w.r.t chemical composition,properties,uses a. Dolomite b. Carbon	A	6	

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG301/MTF301**

COURSE NAME **METALLURGICAL THERMODYNAMICS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **17/ 05 / 2024**

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 EEG 101	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define 'Energy'. State its various forms.	R	1	
	b)	Define the terms: system and surrounding.	R	1	
	c)	Define 'equation of state'.	R	2	
	d)	State first law of Thermodynamics.	R	1	
	e)	Define 'Enthalpy'.	R	1	
	f)	Define 'Heat Capacity'.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe Reversible and irreversible process with example.	U	2	
	b)	State various thermodynamic systems. And explain them.	U	1	
	c)	Describe the term state function and path function and give two examples of each one.	U	1	
	d)	Derive Relation between Cp and Cv.	A	2	
	e)	Internal Energy is a state function. Explain	U	2	
	f)	Describe Exothermic and Endothermic reactions with examples.	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Define 'Metallurgical thermodynamics' and give its significance.	R	1	
	b)	Describe Extensive properties and Intensive properties with examples.	U	1	
	c)	Describe isobaric process and Adiabatic process.	R	1	
	d)	State Hess's law and explain it with suitable example.	U	2	
	e)	Define : i) Heat of formation ii) Heat of combustion.	R	2	

P.T.O.

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	f)	Calculate the standard Heat of formation of $WO_{3(s)}$ from $W_{(s)}$ and $O_{2(9)}$ at 298^0K and 1 at m pressure from the following data. 1) $W_{(s)} + O_{2(9)} \rightarrow WO_{2(9)} \quad \Delta H^o_{f\,298} = -560.66\,KJ/mol$ 2) $3WO_{2(s)} + O_{2(9)} \rightarrow W_3O_{8(s)} \quad \Delta H^o_{f\,298} = -550.20\,KJ/mol$ 3) $W_3O_{8(s)} + \frac{1}{2} O_{2(9)} \rightarrow 3WO_{3(s)} \quad \Delta H^o_{f\,298} = -92.75\,KJ/mol$	A	2	

P.T.O.

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - THREE PROGRAM : METALLURGY (FOUNDRY)

COURSE CODE :-MTG301/ MTF301

COURSE NAME :-METALLURGICAL THERMODYANAMICS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-17/ 5/2024

QN	SQN	**SECTION –II**	R/ U/ A	CO MTG 301	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State mathematical expression of entropy	R	3	
	b)	Define henry's law.	R	4	
	c)	State Sievert's's law	R	4	
	d)	Define equlibrium constant	U	4	
	e)	Define activity coefficient	R	4	
	f)	State the uses of Ellingham diagram	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write Kelvin and Plank statement and mathematical expression of second law of thermodyanamics.Give industrial applications of these law.	R	3	
	b)	State Zeroth law of thermodyanamics.Explain the importance of it.	R	4	
	c)	Describe the importance of intersecting lines on Ellingham diagram.	R	5	
	d)	Draw Ellingham digram for oxides	R	5	
	e)	Calculate the entropy change for the following reaction $CO_{(g)} + 2H_2 \rightarrow CH_3OH$ ▲ S for CO= 197 J/mol K ▲ S for for H_2 = 130.7 J/mol K ▲ CH_3OH = 127.2 J/mol K	A	4	
	f)	Explain the concept of entropy.	U	3	
Q.6		Attempt any **TWO:**			**16**
	a)	Give significance of Ellingham diagram briefly.	U	5	
	b)	Define equilibrium constant give mathematical expression for the same.Give applications of equlibrium constant.	R	4	
	c)	Formulate mathematical expression of combined statement of first and second law of thermodyanamics.	R	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004

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SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : METALLURGICAL ENGINEERING

COURSE CODE : MTG502

COURSE NAME : Environment Protection

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- 17/5/2024

Instruction :-

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

QN	SQN	**Section- I**	R/U/A	CO	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define environment and environmental pollution	R	1	
	b)	Explain ozone depletion problem	A	5	
	c)	Which are 2 Non-process gas evolved in hot rolling mill ?	A	3	
	d)	What is noise pollution?	U	4	
	e)	Write note on acid rain	U	5	
	f)	Note on industrial act and regulation	A	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain in detail about harmful substances evolved in pickling baths of pipe welding?	U	3	
	b)	Explain in detail gas evolved in steel foundries	A	2	
	c)	What are sources and effects of noise pollution	A	4	
	d)	Recommendation for estimating and reducing air pollution	U	3	
	e)	Write a note on gases evolved during pouring cast iron	A	2	
	f)	Write in detail general characteristic of harmful waste gases and dust involved in foundries?	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Write a note on prevention and control of noise pollution	A	4	
	b)	Define photochemical smog and green house effects	R	5	
	c)	Explain drying molds and core in Iron foundries	U	2	
	d)	Discuss the air pollution in rolling mill	U	3	
	e)	Explain generation of dust in department for preparation of molding sands in steel foundries	A	2	
	f)	Write a note on process gases evolved in hot rolling mill	A	3	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : Metallurgical Engineering.

COURSE CODE :- MTG-502

COURSE NAME :- Environment protection

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 17/5/2024

QN	SQN	**SECTION –II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define preliminary treatment	A	6	
	b)	Define Hazardous waste	A	7	
	c)	What is mean by Environment Audit	R	9	
	d)	Write a short note on classification of solid waste	R	7	
	e)	Define Thermal pollution	A	8	
	f)	Write down the radiation exposure standard	R	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write down the disposal and treatment of hazardous waste	U	7	
	b)	Explain Trickling filter	A	6	
	c)	Why secondary treatment are called as biological treatment	R	6	
	d)	Explain phyto exatraction	U	7	
	e)	What are the different types of environment Audit	A	9	
	f)	Write down the causes of thermal pollution	R	8	
Q.6		Attempt any **FOUR:**			**16**
	a)	Discuss the schematic diagram of waste water treatment process.	R	6	
	b)	Discuss Rotating Biological contractors	U	6	
	c)	Write down the sources of Radiation pollution	R	8	
	d)	Write a short note on solid waste management	U	7	
	e)	Write about EIA	R	9	
	f)	Describe Reclamation of synthetic sand in Foundries.	U	7	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG304**

COURSE NAME **IRON AND STEEL MAKING**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **16/ 05 / 2024**

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 304	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write function of core in blast furnace.	U	1	
	b)	List the raw materials used for iron making.	R	1	
	c)	Define 'sponge iron'.	R	2	
	d)	Name any four alloying additions done for steel making.	R	3	
	e)	Write classification of steel.	U	3	
	f)	Name any four 'Steel Making' industries in India.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	State purpose of Agglomeration. Write various types of agglomeration process.	U	1	
	b)	Describe working process of disc pelletizer. Write two advantages of pelletizer process.	U A	1	
	c)	Explain Breakout and Channeling irregularities in blast furnace. Write their causes and remedies.	U	2	
	d)	Enlist various zones in blast furnace with temperatures. Explain any two of them in details.	R	2	
	e)	With a neat labeled diagram, Explain scrubber gas cleaning device.	U	3	
	f)	Explain i) Phosphorus Reaction ii) Silicon Reaction for steel Making.	U A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw a neat labeled diagram of blast furnace showing various zones (with temperatures), parts, and refractories.	R	1	
	b)	State function of fluxes for Iron Making. Write various types of fluxes used for iron making.	U	2	
	c)	Explain irregularities in Blast furnace operation and their remedies i) Pillaring ii) Hanging.	U	2	
	d)	With help of neat diagram explain working of Dust Catcher.	A	2	
	e)	Explain Acidic and Basic Steel Making Process.	U	3	
	f)	Explain deoxiders and alloying additions during steel Making.	U	3	

P.T.O

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG304

COURSE NAME :- Iron and Steel Making

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 16/5/2024

QN	SQN	Question Text	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State working principle of rotor process.	R	4	
	b)	Enlist four primary steel making processes.	R	4	
	c)	State two merits of secondary steel making process.	R	5	
	d)	State functions of vacuum treatment of steel.	U	5	
	e)	Enlist types of continuous casting method.	R	6	
	f)	Write down steps of steel making.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain working of Bessemer process with neat sketch.	U	4	
	b)	Draw neat sketch of open hearth furnace.	A	4	
	c)	State working principle of induction furnace. Draw neat sketch of it.	A	4	
	d)	Draw neat sketch of ladle furnace.	A	5	
	e)	Describe AOD process.	U	5	
	f)	State two merits and two demerits of continuous casting process.	R	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe working of electric arc furnace.	R	4	
	b)	Draw neat sketch of L.D. Converter. Write down steps for production of steel in it.	R	4	
	c)	State working principle, merits and demerits of kaldo process.	U	4	
	d)	Differentiate between VAR and ESR prosesses. (Four Points)	R	5	
	e)	Explain working principle of continuous casting with sketch.	U	6	
	f)	Draw neat sketch of vertical type continuous casting machine.	A	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - **Third** PROGRAM : **Metallurgical Engineering**
COURSE CODE : **MTG307/MTF307**
COURSE NAME : **Physical Metallurgy-I**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **14 May 2024**

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	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Enlist types of imperfections in crystals.	R	1	
	b)	Define Allotropy.	R	1	
	c)	State Gibb's Phase rule.	R	1	
	d)	State significance of Lever rule.	R	2	
	e)	Give the expression for peritectic_ transformation in Fe –C diagram.	R	3	
	f)	Mention allotropic forms of iron ,with temperature of each.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Determine atomic packing factors for B. C. C. and F. C. C. structures.	U	1	
	b)	Define the terms – system Phase ,Alloy and variables.	R	1	
	c)	Explain the process of dendrite formation during solidification of metals.	U	1	
	d)	Enlist different types of reactions in binary system . Explain any two in detail.	U	2	
	e)	Draw a neat labeled Fe-C equilibrium diagram .Indicate the critical temperatures, compositions and phases.	U	3	
	f)	State the necessity for mounting of specimen . Explain procedure for cold mounting.	U	4	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between substitutional and interstitial solid solutions.	R	1	
	b)	Draw and explain cooling curve of pure metals with application of Lever rule.	U	1	
	c)	State the steps in plotting equilibrium diagram for isomorphous system.(Cu-Ni)	A	2	
	d)	Explain the changes in microstructure, during solidification of an eutectic alloy.	U	2	
	e)	Describe the differences in compositions, properties and crystal structures of ferrite and austenite.	U	3	
	f)	Explain various steps for preparation of specimen for metallography.	U	4	

P. T.O.

Q.4		Attempt any **FOUR:**			**08**
	a)	Draw 'A' type distribution of graphite flakes in Gray C. I. Why it is desirable?	R	5	
	b)	Define 'Bronze' .Write chemical composition and applications of Aluminum bronze.	R	6	
	c)	Define 'Babbit'. Write it's applications	R	6	
	d)	Define 'Graptritization'. State alloying dements that favor graphitization.	R	5	
	e)	Write Chemical composition & properties of LM6 alloy.	R	6	
	f)	Write properties of x-brasses.	R	6	
Q.5		Attempt any **Four** :			**16**
	a)	Explain chemical composition ,properties and applications of Duralumin.	U	6	
	b)	Describe modification of Al –si alloys.	U	6	
	c)	Differentiate between S.G. Iron & Gray cast Iron.	A	5	
	d)	Draw Cu-Zn equilibrium diagram & show changes in mechanical properties.	A	6	
	e)	Explain effect of cooling rate on microstructure of cast irons.	A	5	
	f)	Differentiate between lead based & tin based Babbitt.	A	6	
Q.6		Attempt any **Four:**			**16**
	a)	Explain in brief i) Orange peel effect ii) Naval brass	U	6	
	b)	Explain requirements of bearing alloys	U	6	
	c)	Define Cast iron. Write properties of cast iron over steel.			
	d)	Explain season cracking in brasses.	U	6	
	e)	Describe Al-Cu alloy equilibrium diagram. Write its alloys examples.	U	6	
	f)	Explain Malleabalizing heat treatment.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG 404 / MTF 404

COURSE NAME: - POWDER METALLURGY

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: - 14/5/2024

QN	SQN	SECTION –II	R/U/A	Co MTG 404	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define Powder Compaction.	R	4	2
	b)	Write advantages of powder rolling.	A	4	2
	c)	State required properties for die material for die compaction.	U	4	2
	d)	Write classification of powder compaction.	R	4	2
	e)	State purpose of sintering.	U	5	2
	f)	Write applications of Tool materials.	A	6	2
Q.5		Attempt any **FOUR:**			**16**
	a)	Define Tool materials. Write properties required for tool material.	R U	6	4
	b)	Explain steps followed for production of oil impregnated porous bearing.	U	6	4
	c)	Define Sintering Atmosphere. Write any four functions of Sintering atmosphere.	R U	5	4
	d)	List various pressure less compaction methods .Explain any one method in detail.	R U	4	4
	e)	Write role of lubrication in powder compaction .Name any two lubricants used for powder compaction.	R A	4	4
	f)	State any four advantages of cold isostatic pressing/compaction.	A	4	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe green density distribution for single and double die compaction of metal powder.	U	4	4
	b)	Write applications of cold Isostatic Compaction.	A	4	4
	c)	Define Die Compaction .List various die compaction techniques. Explain any one in detail.	R U	4	4
	d)	Explain three stages of solid state sintering.	U	5	4
	e)	Define post sintering operations.Explin any two post sintering operations.	R U	5	4
	f)	Write properties required for porous bearing.	U	6	4

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WINTER / SUMMER-2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 4 PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG404 / MTF404

COURSE NAME :- Powder Metallurgy

MAX. MARKS : 80 TIME : 03 Hrs DATE :- 14/5/2024

Instruction :-

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

QN	SQN	**SECTION -I**	R/U/A	Co MTG 404.	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define powder metallurgy.	R	1	
	b)	Enlist any four applications of powder metallurgy.	A	1	
	c)	Enlist methods of iron powder production.	R	2	
	d)	Define : 1) Apparent density 2) Tap density.	A	3	
	e)	Give classification of metal powder production methods.	R	2	
	f)	Write down the steps of powder metallurgy.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	State two advantages and two disadvantages of powder metallurgy.	R	1	
	b)	Write down scope of powder metallurgy in industry. Enlist two powder metallurgical companies in India.	U	1	
	c)	State various shapes of powder particles & their effect on properties of component.	U	3	
	d)	Describe condensation method of metal powder production.	R	2	
	e)	State working principle of atomization method used for metal powder production. State its two advantages.	U	2	
	f)	Explain electrolysis method of metal powder production with an example.	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain working principle of carbonyl method for metal powder production with an example.	A	2	
	b)	Compare powder metallurgy method with casting process. (Four Points)	U	1	
	c)	Differentiate between grinding and crushing methods for metal powder production. (Four Points)	U	2	
	d)	Metal powder with its application is given below. Suggest suitable powder production method for these with justification - 1. Al powder for aerospace. 2. Cu for bearings.	A	2	
	e)	Draw Hall–flow meter. State its importance.	A	3	
	f)	Write down the procedure to determine the flow rate of given metal powder.	U	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG310/MTE401**

COURSE NAME **METAL WORKING PROCESSES**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **13/ 05 / 2024**

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)	Write classification of metal forming processes.	U	1	
	b)	Define cold working. Write its application.	R	1	
	c)	State objective of metal forming processes.	U	1	
	d)	Write principle of 'Rolling'.	R	2	
	e)	Draw a neat sketch of a two high and three high rolling mill.	U	2	
	f)	Name heat treatment done on carbon steel wires (0.4-0.8%C) . State its advantages.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Distinguish between hot working and cold working.	A	1	
	b)	Explain various types of passessand roll pass Design in rolling.	U	2	
	c)	State causes and remedies for the defect. Edge cracking.	A	2	
	d)	With a neat diagram, explain 'planetary mill'.	U	2	
	e)	Write size ranges of starting and finishing materials used for wire drawing.	U A	3	
	f)	With neat diagram explain various zones in drawing dies.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the requirement/need for preheating of steels. Name furnaces in which it is done	U	1	
	b)	Explain continuous furnaces principle and working process.	A	1	
	c)	Draw a neat sketch of rolling mechanism and explain the terms 'neutral plane' and 'neutral angle'.	U	2	
	d)	Describe the parameters for rolling geometry. i) Draught ii) Forward slip.	R U	2	
	e)	Explain phosphate coating done on wires. State its advantages of coating.	U	3	
	f)	Explain working of Draw Bench.	U	3	

P.T.O

QN	SQN	Question Text	R/U/A	Co MTG 310	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define shearing and blanking operation.	U	6	
	b)	Enlist various applications of forging.	A	4	
	c)	Enlist various hand forging tools.	R	4	
	d)	Define drawing out operation of forging.	R	4	
	e)	Define forging.	U	4	
	f)	Draw a neat sketch of impact extrusion.	R	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain drop board hammer.	A	4	
	b)	Explain Tube extrusion.	A	5	
	c)	Explain clearance between die and punch in bending.	U	6	
	d)	Explain rubber pad bending.	U	6	
	e)	Explain forging defects and cause and prevention methods.	R	4	
	f)	Define piercing and punching operation in sheet metal forming.	A	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain bending with stretching operation in sheet metal.	A	6	
	b)	Explain direct extrusion.	R	5	
	c)	Enlist and explain various variables in extrusion.	U	5	
	d)	Explain hydrostatic extrusion.	R	5	
	e)	Explain pneumatic hammer.	U	4	
	f)	Explain die design consideration in forging.	A	4	

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG305/MTF305**

COURSE NAME **FOUNDRY TECHNOLOGY- I**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **11/ 05 / 2024**

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)	Write the advantages of cost iron as pattern material.	R	2	
	b)	Define compactibility. Write the effect of moisture on compactibility.	R	3	
	c)	Write the role of core print on pattern.	R	2	
	d)	Write the characteristics of shell pattern.	R	4	
	e)	State various types of pattern.	R	2	
	f)	State the disadvantages of casting process.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	State ingradients of green sand. Explain their functions.	U	3	
	b)	Explain dump box process of making shells with neat sketches.	U	4	
	c)	Describe loam sand moulding process.	R	4	
	d)	Explain the mechanism of hardening CO_2 mould. Write the advantages of CO_2 moulding process.	A	3	
	e)	Explain any four defects observed in shell making.	U	4	
	f)	Explain the need for sand reclamation.	A	3	
Q.3		Attempt any **FOUR:**			16
	a)	Explain the ingradients used in green sand moulding. State their roles.	A	4	
	b)	State the allowances provided on pattern. Explain any two allowances.	U	2	
	c)	Define permeability of mould. Describe the test used to measure permeability.	U	2	
	d)	State various types of cores. Explain any two with neat sketches.	U	3	
	e)	What are the types of foundries? Explain. State various section of a cast iron foundry.	U	1	
	f)	Explain i) Core venting ii) Active clay and Dead clay.	A	2	

P.T.O

QN	SQN	Question Text	R/U/A	Co MTG 305	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define 'Die' used for casting process.	R	5	
	b)	State the principle of gravity die casting process.	R	5	
	c)	Why investment casting is known as precision casting process?	U	5	
	d)	Enlist the raw materials used as 'charge' in cupola furnace. State role of each in brief.	R	6	
	e)	Which are the parts of a solidified casting that need to be 'cut' before its used as final casting?	U	7	
	f)	What is 'tumbling' of a casting?	R	7	
Q.5		Attempt any **FOUR:**			**16**
	a)	With a neat diagram, explain the construction of a typical die used for gravity die casting.	R	5	
	b)	State the advantages and limitations of using 'pressure' in die casting processes.	R	5	
	c)	Explain the working of slush casting process.	R	5	
	d)	Draw a neat labeled diagram of a cupola furnace.	U/R	6	
	e)	Which are the different types of cupola? Write characteristics and application of each type.	R/A	6	
	f)	Suggest a suitable molding process for lathe bed. Give reasons for your suggestion.	A	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	With neat diagram explain the set-up and working of semi-centrifugal casting process.	U	5	
	b)	Explain the operation and control of hot chamber die casting process with neat sketches.	U/A	5	
	c)	Differentiate between pit moulding and floor moulding.	U	5	
	d)	Explain ceramic molding process.	U	5	
	e)	Describe the melting procedure in cupola furnace.	U	6	
	f)	Differentiate between shot blasting and sand blasting operations.	U	7	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - FOUR PROGRAM : **Metallurgy**

COURSE CODE :- MTG403

COURSE NAME :- Failure analysis and selection of materials

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 10/5/2024

Instruction :-

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

QN	SQN	**SECTION -I**	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What are the different coatings used to prevent corrosion of materials.	U	4	
	b)	Define fracture toughness of materials.	R	2	
	c)	Explain effect of stress raisers in failure of materials.	U	2	
	d)	Define stress corrosion cracking in material.	R	4	
	e)	Define DBTT.	U	3	
	f)	Why Brittle fracture is considered dangerous than ductile fracture?	A	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the corrosion mechanism of storage tanks.	U	4	
	b)	Explain components of failure analysis report.	A	1	
	c)	Explain different types of failure of materials.	U	1	
	d)	Define critical crack size and crack growth under fatigue loading.	R	2	
	e)	Explain the concept of intergranular cracking with suitable example.	U	4	
	f)	What are the different NDT techniques used to detect fracture failure of materials.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Discuss different modes of wear failure in bearing and steps to prevent failure.	R	1	
	b)	Compare Ductile and brittle fracture of materials.	U	2	
	c)	Discuss factors influence in brittle to ductile transition state.	U	2	
	d)	Discuss the dealloying corrosion in failure analysis. Write example of dealloying.	U	4	
	e)	How Finite element analysis technique is used to find fatigue strength of materials?	A	3	
	f)	Suggest suitable materials for the following components and justify your selection a) Crank shaft b) Razor blade	A	3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM : Metallurgical Engineering

COURSE CODE :- MTG 403

COURSE NAME :- FAILURE ANALYSIS & SELECTION OF MATERIALS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 10/5/2024

QN	SQN	**SECTION –II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define Formability. State its importance.	R		
	b)	Explain about material selection & state its importance	R		
	c)	State applications of Martensitic Steel & applications of it.	R		
	d)	State suitable material for Lathe machine bed & justify	U		
	e)	Differentiate between High alloy & Low alloy steel	R		
	f)	Define "Erosion	U		
Q.5		Attempt any **FOUR:**			**16**
	a)	Suggest suitable material for following parts & justify selection. 1) Piston 2) Crankshaft 3) Engine cylinder Head	A		
	b)	State requirements of heat resistant alloy & classify these alloys	U		
	c)	Define Weldability. Explain factors affecting Weldability	U		
	d)	Explain the differences between hard & soft magnets	R		
	e)	Explain steps involved in material selection	U		
	f)	Differentiate between tool steel & alloy steel	R		
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain properties & applications of cold working dies.	R		
	b)	Select a material for following component & justify the selection 1) Bearings in marine sector	A		
	c)	Differentiate between metallic & abrasive wear	R		
	d)	Select a material for following component & justify the selection 1) Pump casing	A		
	e)	Differentiate between austenitic & martensitic stainless steels	R		
	f)	State the usage areas of Martensitic stainless steel & state its properties.	R		

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTG309/MTF309**

COURSE NAME **FURNACES, REFRACTORIES & PYROMETRY**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **03/ 05 / 2024**

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 309	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Refractories and give its example.	R	1	
	b)	Define furnace and list the different metallurgical furnace.	U	2	
	c)	List the properties of fire clay refractory.	U	1	
	d)	List the steps which used in manufacturing of refractories.	R	1	
	e)	What is pit furnace?	U	3	
	f)	Explain i) Damper ii) Control volve.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe the properties of Refractories.	R	1	
	b)	Draw cupola and name it.	U	2	
	c)	Explain i) Fire clay Refractory. ii) Alumina Refractory.	U	1	
	d)	Describe muffle bell furnace.	U	3	
	e)	Explain construction and working of Direct arc furnace.	U	2	
	f)	Describe the pusher type furnace with its advantages and application.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain crucible furnace with its advantages and limitation.	R	3	
	b)	Explain Tunnel furnace with its advantages.	U	3	
	c)	Explain the classification of Refractories on their chemical nature with example.	U	1	
	d)	Give the classification of furnaces.	R	2	
	e)	Describe Reverberatory furnace with its advantages.	R	2	
	f)	Give the advantages, disadvantages and application of Indirect arc furnace.	U	2	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : Diploma in Metallurgical Engineering
COURSE CODE : MTG309 / MTF309
COURSE NAME : Furnaces, Refractories and Pyrometry
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- 03/05/2024

QN	SQN	Question Text	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Enlist electric furnaces.	R	4	
	b)	State principle of electric arc furnace.	R	4	
	c)	Enlist two non-ferrous metal melting furnaces.	R	5	
	d)	Enlist four non-ferrous metals.	R	5	
	e)	Enlist temperature measuring devices used in furnaces.	R	6	
	f)	Define Seeback Effect.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Describe construction of indirect arc furnace.	U	4	
	b)	Enlist induction furnaces. Describe working of any one induction furnace	R	4	
	c)	Draw neat sketch of direct arc furnace.	A	4	
	d)	Explain working principle of lift out type coke fired furnace with neat sketch.	U	5	
	e)	Explain working of total radiation pyrometer with neat sketch.	A	6	
	f)	Define pyrometry. State its importance in metallurgical fields.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	State advantages, limitations and uses of direct arc furnace.	R	4	
	b)	Differentiate between electric arc furnace and induction furnace. (Four Points)	U	4	
	c)	Draw tilting type gas fired furnace.	A	5	
	d)	Enlist four thermocouples with composition.	R	6	
	e)	Write about the following temperature measuring devices: (i) Colour, (ii) Segar cones.	U	6	
	f)	Explain working of resistance pyrometer with neat sketch.	A	6	

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WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 6 PROGRAM : METALLURGY(FOUNDRY)

COURSE CODE :- MTG 406

COURSE NAME :- METAL JOINING AND FORMING PROCESSES

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 03/ 5/ 2024

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)	Describe heterogenous welding	R	1	
	b)	Define arc blow	U	3	
	c)	State the principle of resistance welding	U	4	
	d)	State the properties of acetylene gas used for gas welding	R	2	
	e)	State applications of thermit welding	A	4	
	f)	State classification of welding torches	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	State classification of welding	R	1	
	b)	Explain the principle and working of shielded metal arc welding	U	3	
	c)	State advantages,disadvantages and applications of oxyacetylene gas welding	A	2	
	d)	Describe projection welding process with its advantages disadvantages and applications	U	4	
	e)	Explain the working of explosion welding process	U	4	
	f)	Explain thermit welding process	U	4	
Q.3		Attempt any TWO:			**16**
	a)	State and explain flames used in oxyacetylene gas welding and their applications	A	2	
	b)	Explain the working of oxyacetylene gas welding with its diagram	U	2	
	c)	Explain with diagram metal inert gas welding (MIG) its advantages disadvantages and its applications	U	3	

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WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG 406

COURSE NAME :- Metal Joining & Special Forming Processes

MAX. MARKS: **80** TIME: **03 Hrs.** DATE :-03/5/2024

Instruction:-

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

QN	SQN	**SECTION -II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Differentiate between heat affected zone and unaffected zone. (Two Points)	U	5	
	b)	Give composition of two solder materials.	A	6	
	c)	Enlist four defects in welding.	R	7	
	d)	Suggest suitable NDT method to determine slag inclusion in weld metal.	A	7	
	e)	State working principle of electrochemical machining.	U	8	
	f)	State the characteristics of powder forging process.	A	8	
Q.5		Attempt any **FOUR:**			**16**
	a)	State the roles of preheat and post heat treatment in welding.	R	5	
	b)	Draw various types of weld joints.	A	5	
	c)	Define soft solders. State two requirements of soldering alloys.	R	6	
	d)	Describe any one brazing method.	U	6	
	e)	Explain ultrasonic testing method with neat sketch.	A	7	
	f)	State causes and remedies of inclusion and porosity defects in welding.	U	7	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain heat affected zone with neat sketch.	U	5	
	b)	Differentiate between soldering and brazing. (Four Points)	U	6	
	c)	State working principle, any two advantages and limitations of electro discharge machining.	R	8	
	d)	Draw neat sketch of electrochemical machining. Give two applications of it	A	8	
	e)	State working principle of cold forging. State its two advantages.	R	8	
	f)	Explain the steps of powder forging process.	U	8	

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WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - IV

PROGRAM : Diploma in Metallurgical Engineering

COURSE CODE :- MTG 401/MTF401

COURSE NAME :- Physical Metallurgy -II

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/05/2024

QN	SQN	SECTION –I	R/U/A	MIG 401	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Draw a neat sketch of CCT diagram .write its limitation.	R	1	
	b)	State the structural changes occurring during tempering.	R	4	
	c)	State various types of furnace atmospheres.	R	3	
	d)	Write various types of annealing.	R	2	
	e)	State meaning of self-tempering.	U	4	
	f)	Write applications of normalizing.	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain mechanism of austenitic transformation.	U	1	
	b)	Write the effect of alloying elements on TTT diagram.	U	1	
	c)	Differentiate between pearlitic and bainitic transformation.	U	1	
	d)	Describe 3 stages of quenching.	R	3	
	e)	Draw TTT diagram for hypereutectoid steels and explain.	U	2	
	f)	State the characteristics of martensitic transformation.	U	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between hardening and tempering.	U	3	
	b)	Describe homogenizing treatment.	U	3	
	c)	Explain secondary hardening occurring during tempering.	U	4	
	d)	Explain the process of hardening treatment.	R	3	
	e)	Write the advantages and disadvantages of annealing treatment.	A	2	
	f)	Write the need for furnace atmospheres. State its types.	A	3	

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WINTER / SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM : **Metallurgical Engineering**

COURSE CODE :- MTG401 / MTF401

COURSE NAME :- Physical Metallurgy II

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/05/2024

QN	SQN	**SECTION –II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State different safety rules of Heat treatment shop.	R	10	
	b)	Write effect of cold working process on nonferrous metals.	U	9	
	c)	Write different applications of pack carburizing.	R	6	
	d)	Explain properties and applications of malleable cast iron.	R	8	
	e)	What is mean by GP zones in precipitation hardening.	U	9	
	f)	Explain different precautions that should be taken care in Heat treatment shop.	R	10	
Q.5		Attempt any **FOUR:**			**16**
	a)	Describe gas carburizing heat treatment process.	U	6	
	b)	Describe Jominy end quench method used to determine hardenability of material.	A	5	
	c)	Write advantages, limitations and applications of flame hardening process.	R	7	
	d)	Explain Heat treatment process used for Gray cast iron.	A	8	
	e)	Explain mechanism of precipitation hardening.	U	9	
	f)	Comment on different factors which are affecting hardenability of material.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the use of Hardenability curve in industry.	A	5	
	b)	Write difference between Carburizing and nitriding heat treatment processes.	U	6	
	c)	Explain plasma nitriding with its advantages, disadvantages and applications.	R	6	
	d)	Explain the effect of annealing on cold worked Copper.	U	9	
	e)	When we can use surface hardening explain with suitable example?	A	7	
	f)	Describe induction Hardening heat treatment process in detail.	U	7	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL: - THIRD PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG 312

COURSE NAME :- EXTRACTION OF NON FERROUS METALS

MAX. MARKS: **80** TIME: **03 Hrs.** DATE :- 25/5/2024

QN	SQN	Question Text	R/U/A	Co MTG 312	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write down various ores/minerals of Zinc.	R	4	2
	b)	Write down the ores of Aluminum.	R	5	2
	c)	Write raw material required to produce one Ton of Aluminum	U	5	2
	d)	Write applications of Gold.	R	6	2
	e)	Write applications of Tungsten.	R	6	2
	f)	List the Ores of Tungsten	R	6	2
Q.5		Attempt any **FOUR:**			**16**
	a)	State the purpose of roasting of Zinc concentrate	U	4	4
	b)	Describe 'Fluidized bed roasting process for Zinc Oxide' with proper diagram.	U, R	4	4
	c)	Draw flow chart for extraction of Alumina by Bayer Process	U	5	4
	d)	Draw flow chart for synthesis of Cryolite	U	5	4
	e)	Explain Anode Effect in detail	U	5	4
	f)	Draw flow chart for extraction of Gold	U	6	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Draw flow sheet for Hydrometallurgical Extraction of Zinc	U	4	4
	b)	Explain Electrolytic process for Zinc Extraction	U	4	4
	c)	Describe Electrolytic Reduction Cell for Aluminum Extraction	U	5	4
	d)	Draw flow chart for manufacturing process for carbon electrode	R	5	4
	e)	Explain Chlorination process for extraction of Gold	U	6	4
	f)	Explain extraction of Silver by Chloridizing.	U	6	4

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : METALLURGY

COURSE CODE :- MTG 312

COURSE NAME :- EXTRACTION OF NON-FERROUS METALS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 25/5/2024

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

QN	SQN	Question Text	R/U/A	Co MTG 312	Marks
Q.1		Attempt any **FOUR:**		1	**08**
	a)	1. Define - a. Ore b. Gangue.	R	2	
	b)	Write 4 important ores of copper.	R	2	
	c)	Define Blister copper.	U	2	
	d)	Write properties of lithium.	A	3	
	e)	Write objectives of roasting copper ore.	U	2	
	f)	List applications of titanium.	A	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the following a. Crushing of ore. b. Grinding of ore	R	1	
	b)	Draw and explain jaw crusher.	R	1	
	c)	Describe froth flotation method for extraction of Cu.	R	2	
	d)	State advantages and disadvantages of hydrometallurgical route for extraction of copper.	U	2	
	e)	Draw flow sheet describing production of titanium sponge.	A	3	
	f)	Describe Acid leaching for Ilmenite.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain various types of milling processes	R	1	
	b)	Describe magnetic separation method with neat diagram.	A	1	
	c)	Draw neat diagram of electrolytic refining for extraction of copper	A	2	
	d)	Write a note on OFHC copper. Give its applications.	A	2	
	e)	Explain Kroll's process.	R	3	
	f)	Give various properties of titanium. Why is extraction of Ti expensive?	U	3	

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'SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL: - THIRD PROGRAM: METALLURGICAL ENGG

COURSE CODE: - MTG 312

COURSE NAME :- EXTRACTION OF NON FERROUS METALS

MAX. MARKS: **80** TIME: **03 Hrs.** DATE :- 25/5/2024

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : METALLURGY

COURSE CODE :- MTG 312

COURSE NAME :- EXTRACTION OF NON-FERROUS METALS

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 25/5/2024

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
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	c)	Define Blister copper.	U	2	
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	e)	Write objectives of roasting copper ore.	U	2	
	f)	List applications of titanium.	A	1	
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	a)	Explain the following a. Crushing of ore. b. Grinding of ore	R	1	
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