GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.
(An Autonomous Institute of Govt. of Maharashtra)
EVEN TERM END EXAM APRIL/MAY -2018
EXAM SEAT NO.

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

COURSE CODE: **MTF305/MTE306**   COURSE NAME: **FOUNDRY TECHNOLOGY -I**

MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **14/05/2018**

Instruction:-

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

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QN	SQN	Question Text	RUA	CO MTF 305	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define the foundry. What are the types of foundry?	R	1	
	b)	What are the colour codes used for different areas of pattern?	A	2	
	c)	State the types of pattern.	U	2	
	d)	What is core & core print?	U	2	
	e)	State types of sand used in moulds?	R	3	
	f)	Define sand reclamation sand preparation.	A	4	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Distinguish between metal casting process Vs metal forming process.	A	1	
	b)	What are the allowances given to the pattern? Explain any two allowances in details.	A	2	
	c)	Explain in details materials for making pattern?	U	2	
	d)	Draw & explain types of core boxes (explain any two)	R	3	
	e)	Write down the sand testing method (explain any two)	U	3	
	f)	Explain advantages, disadvantage, application & diagram of shell moulding process.	A	4	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Write down furetions of pattern.	U	2	
	b)	How selections of pattern material decide?	R	2	
	c)	Distinguish between Green sand moulding & Dry sand moulding.	A	3	
	d)	What are the principle ingredients of sand? Explain the role of each.	A	3	
	e)	Write down the moulding methods. (explain any two)	U	4	

P.T.O

	f)	Explain principle, operation & diagram of CO_2 moulding process?	A	4	
Q.4		Attempt any **FOUR**			**(08)**
	a)	State low pressure die casting.	U	5	
	b)	State the principle of continuous casting process.	U	5	
	c)	Define ceramic moulding.	U	6	
	d)	State steps involved in plaster moulding?	A	6	
	e)	State different types of cupola?	R	7	
	f)	State principle of induction furnace?	A	7	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Differentiate between pressure die casting & Gravity die casting?	A	5	
	b)	Write the advantages and disadvantages of continuous casting process?	R	5	
	c)	Explain the stack moulding process with neat sketch?	U	6	
	d)	Explain "slush casting".	U	6	
	e)	Explain hot blast cupola? Write advantages and disadvantages of hot blast cupola.	U	7	
	f)	Explain principle of direct arc furnace & indirect arc furnace.	A	7	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Explain submerged plunger die casting process.	R	5	
	b)	Explain centrifugal casting process with neat sketch.	R	5	
	c)	Explain the pit and floor moulding process.	R	6	
	d)	Differentiate between coreless and core induction furnace.	U	7	
	e)	Draw a neat sketch of cupola furnace.	R	7	
	f)	Select the proper moulding process for any one component & justify your answer i) Piston ring ii) Turbine housing.	A	8	

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LEVEL: **THREE** PROGRAM: **METALLURGY**
COURSE CODE: **MTE310** COURSE NAME: **METAL JOINING & FORMING PROCESS**
MAX. MARKS: **80** TIME: **3 HRS.** DATE: **16/05/2018**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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Q.1		Attempt any **FOUR**	Marks (08)
	a)	What is the function of flash arrestor in gas welding process ?	
	b)	What is the principle of resistance welding process ?	
	c)	What is the function of filler & flux in gas welding ?	
	d)	What is the working principle of explosion welding ?	
	e)	State the principle of arc welding.	
	f)	What is process torch angle & filler rod angle in gas welding ?	
Q.2		Attempt any **TWO**	(16)
	a)	Draw a set up of oxy-acetylene welding process labeled each part, write the role of each part.	
	b)	Explain different types of flame used in oxy-acetylene gas welding process. Draw the diagram.	
	c)	Explain the tungsten inert gas arc (TIG) welding process.	
Q.3		Attempt any **TWO**	(16)
	a)	Explain submerged arc welding process.	
	b)	Explain laser welding process in detail.	
	c)	Explain different types of welding zone during welding process.	
Q.4		Attempt any **FOUR**	(08)
	a)	Name four welding joints.	
	b)	Define : i) Bead, ii) Crater.	
	c)	Define soldering.	
	d)	Enlist four welding defects.	
	e)	State the principle of ECM.	
	f)	State the principle of cold forging.	

[P.T.O]

Q.5		Attempt any **FOUR**	(16)
	a)	What you know about heat treatment of welding?	
	b)	Enlist practical applications of welding.	
	c)	Discuss about heat affected zone in welding.	
	d)	Differentiate between soldering and brazing.	
	e)	Write about flux and their functions with respect to soldering.	
	f)	Enlist applications of brazing.	
Q.6		Attempt any **FOUR**	(16)
	a)	Describe : i) Poor fusion, ii) Spatter.	
	b)	What you know about NDT ?	
	c)	Describe EDM process with sketch.	
	d)	Enlist product applications of ECM.	
	e)	Describe powder forging.	
	f)	Describe drop forging. State its applications.	

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LEVEL: **FOURTH**   PROGRAM: **METALLURGY**
COURSE CODE: **MTE401**   COURSE NAME: **METAL WORKING PROCESSES**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **16/05/2018**

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

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	Section – I	Marks

Q.1   Attempt any **FOUR**   **(08)**

    a) What is elastic and plastic deformation?

    b) Name the raws materials used for rolling and the final products after rolling.

    c) State the principle of rolling of metals.

    d) What is meant by planetary rolling mill?

    e) Define Roll pass.

    f) Why baking of wire is necessary?

Q.2   Attempt any **FOUR**   **(16)**

    a) What are the different methods of preheating steels before their forming?

    b) Explain the classification of rolling mills based on the working stand design.

    c) What is spread? Explain the factors which affects spread during rolling.

    d) With a neat diagram, indicate and describe the significance of neutral plane and neutral angle.

    e) Give causes and remedies for any four wire drawing defects.

    f) Explain patenting heat treatment of wires.

Q.3   Attempt any **FOUR**   **(16)**

    a) Why some metals need to be hot worked? State advantages of hot working over cold working.

P.T.O

b) Explain the classification of metal forming processes based on the type of force applied for forming.

c) Mechanical properties of plastically deformed metals are superior than casted metals. Give reasons.

d) Draw a neat labelled plant layout of a rolling mill.

e) Explain the steps involved in preparation of wires for drawing.

f) With a neat labelled diagram, explain the construction and working of Draw bench.

<div align="center">Section – II   Marks</div>

Q.4   Attempt any **FOUR**   **(08)**

a) Enlist various hand forging operations.

b) What are the characteristics of forged components?

c) What are mandrels?

d) Why lubricants are required in extrusion?

e) What is piercing?

f) Explain spring back in sheet metal work.

Q.5   Attempt any **FOUR**   **(16)**

a) Explain the principle of working of mechanical press with simple sketch.

b) Describe the impact extrusion process with simple sketch.

c) What is extrusion? Draw & explain tooling arrangement for extrusion.

d) Explain shearing and blanking operation in sheet metal working.

e) Enlist various parts made by sheet metal working. Give two important characteristics.

f) Explain shearing and notching.

Q.6   Attempt any **TWO**   **(16)**

a) Enlist various machines used in forging. Explain pneumatic hammer with simple sketch.

b) Describe the process of making hexagonal bolt from round bar of M.S by forging operation.

c) i) Explain details on extrusion process.

    ii) What is hydrostatic extrusion?

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LEVEL : - THIRD   PROGRAM : METALLURGY
COURSE CODE :- MTF309/MTE101
COURSE NAME :- FURNACES REPRACTORIES & PYROMETRY
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 02/ 05 / 2018

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	Code MTF101	Marks
Q.1		Attempt any **FOUR:**			08
	a)	State two uses of Silica refractory.	A	1	
	b)	Why acidic refractory note suitable for basic slagmaning.	R	1	
	c)	Enlist various test of refractory.	A	1	
	d)	Define term 'Refractoriness'.	U	1	
	e)	State name and chemical formula of special refractory.	U	1	
	f)	State role of 'fan' in furnace.	R	2	
Q.2		Attempt any **FOUR:**			16
	a)	Enlist various factor associate with selection of refractory. State uses of Alumina refractory.	R	1	
	b)	Explain various reason of refractory failure in furnace. How they over come.	U/A	1	
	c)	State various advantages and disadvantages of direct arc furnace.	A	2	
	d)	Explain role of burner as auxiliary in furnace.	R	2	
	e)	State two advantages & uses of Rotary furnace.	A	2	
	f)	Explain advantages and uses of pit furnace.	A	2	
Q.3		Attempt any **FOUR:**			16
	a)	Explain advantages and disadvantages;indirect arc furnace.	U	2	
	b)	Enlist various heat treatment furnace. How they differ from melting furnace.	R	3	
	c)	Explain working & uses of pusher type furnace.	U	3	
	d)	Explain principle of muffle furnace. State which heat treatment possible in muffle furnace.	R	3	
	e)	Explain working of Box type furnace.	R	3	
	f)	What is mean by 'furnace atmosphere'? Why it is important to controls?	U	1	

P.T.O.

QN	SQN	Question Text	R/U/A	Code MTF101	Marks
Q.4		Attempt any **FOUR**:			08
	a)	What is electromagnetic induction?	R	4	
	b)	What is crucible furnace? List the type of crucible.	R	5	
	c)	Explain seebeck effect.	U	6	
	d)	What is seger cone? Give its uses.	U	6	
	e)	What is pit furnace?	U	5	
	f)	State the principle of induction furnace.	U	4	
Q.5		Attempt any **FOUR** :			16
	a)	List the advantages and disadvantages of induction furnace.	R	4	
	b)	State and explain direct core type induction furnace.	U	4	
	c)	List the advantages and limitation of core type furnace.	R	4	
	d)	Describe the crucible furnace of tilting type.	U	5	
	e)	State and explain the thermoelectric pyrometer. (thermocouple)	U	6	
	f)	Explain i) Peltier effect ii) Thermopile.	U	6	
Q.6		Attempt any **FOUR**:			16
	a)	Write construction and working of Total radiation pyrometer.	U	6	
	b)	Explain i) Wein's Law. ii) Boltz Man's Law.	U	6	
	c)	What are the types of thermocouple? Explain Base metal	U	6	
	d)	State the principle of crucible furnace and list their unique combination proper-ties.	R	5	
	e)	Write note on indirect core type induction furnace.	R	4	
	f)	Explain indirect arc furnace with its advantages.	U	4	

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EVEN TERM END EXAM MAY -2018
EXAM SEAT NO.

LEVEL : - FOURTH   PROGRAM : METALLURGY
COURSE CODE :- MTE405
COURSE NAME :- FAILURE ANALYSIS AND SELECTION OF MATERIAL
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 04 / 05/ 2018

Instruction :-
1) Answer to 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.
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QN	SQN	Section- I	Marks
Q.1		Attempt any **FOUR**:	08
	a)	Write the content required in failure analysis report.	
	b)	What is ductile failure?	
	c)	What is meant by DBTT?	
	d)	What are the different types of fractures?	
	e)	What is meant by 'plane strain condition/?	
	f)	Define 'Fracture Toughness'.	
Q.2		Attempt any **FOUR**:	16
	a)	What are the basic modes of fracture?	
	b)	Differentiate between ductile and brittle fracture.	
	c)	Explain the mechanism of crack growth under cyclic loading.	
	d)	What are the steps in investigation of failure?	
	e)	Explain stress corrosion cracking.	
	f)	Differentiate between strength reducers and stress raisers.	
	g)	What are the factors which influence brittle facture?	
Q.3		Attempt any **FOUR**:	16
	a)	What are the various categories of stressors? Explain any two in detail.	
	b)	Explain how Fracture toughness is used to predict performance of components.	
	c)	Describe the development of 'beach mark' on surface of fatigue failure.	
	d)	What are the various causes of failure of engineering components? Explain in any one in detail.	
	e)	What is meant by critical crack size? What is its importance in fracture?	
	f)	What is meant by corrosion fatigue?	

P.T.O.

QN	SQN	Section- II	Marks
Q.4		Attempt any **FOUR:**	08
	a)	~~What is stress corrosion cracking?~~ Write chemical composition & application of Inconel alloy	
	b)	What is formability?	
	c)	Write the suitable material for manufacturing of crank shaft. Justify your selection.	
	d)	What is erosion?	
	e)	How tool steels are different from alloy steel?	
	f)	What are HSLA steels?	
Q.5		Attempt any **FOUR:**	16
	a)	Write any two situations that involve material selection problem.	
	b)	What are heat resistant alloys? Write their chemical composition and applications.	
	c)	What is forgeability? Write the factors affecting forgeability/	
	d)	Explain the use of computers in selection of material.	
	e)	Describe cavitation type of wear.	
	f)	Select a material for any two of the following components. i) Propeller shaft ii) Vernier Caliper.	
Q.6		Attempt any **TWO:**	16
	a)	Differentiate between cold working and hot working dies.	
	b)	What are the steps involved in material selection?	
	c)	'Erosion corrosion is a major problem observed in chemical & petrochemical industries'. Explain.	

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EVEN TERM END EXAM MAY -2018
EXAM SEAT NO.

LEVEL : - **THIRD**   PROGRAM : **METALLURGY**
COURSE CODE :- **MTF301**
COURSE NAME :- **METALLURGICAL THERMODYNAMICS**
MAX. MARKS : 80   TIME : **3 HRS.**   DATE :- 04/ 05 / 2018

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
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7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	CO MTF301	Marks
Q.1		Attempt any **FOUR**:			08
	a)	Define thermodynamics.	R	1	
	b)	Define Enthalpy and its SI unit.	R	2	
	c)	Draw P-V diagram for isothermal process.	U	1	
	d)	What is thermo-chemisty?	R	2	
	e)	Define property and state.	R	1	
	f)	State Hess's Law.	R	2	
Q.2		Attempt any **FOUR**:			16
	a)	State and explain first law of thermodynamics.	U	2	
	b)	Explain the term Energy and distinguish between the heat and work.	U	1	
	c)	Define reversible and irreversible process. What are the factors making the process irreversible?	U	1	
	d)	Explain classification of property with examples.	U/A	1	
	e)	What are the various sources of energy?	U	1	
	f)	Explain significance of Hess's law.	U	2	
Q.3		Attempt any **TWO**:			16
	a)	Draw P-V & T-S diagram for all thermodynamic processes. i) Isobaric ii) Isothermal iii) Isochoric iv) Adiabatic v) Polytropic.	U/A	1	
	b)	Derive the mathematical expression for Enthalpy. State the meaning of symbols of notations used.	U	2	
	c)	Give SI unit of following 1) i) enthalpy ii) Entropy iii) Internal Energy iv) Specific heat. 2) Differentiate between reversible and irreversible process.	U	1	

P.T.O.

Q.N	SQN	Question Text	R/U/A	Code MTF 301	Marks
Q.4		Attempt any **FOUR**:			**08**
	a)	Define Entropy.	R	3	
	b)	State Zeroth law of thermodynamics.	R	4	
	c)	Define 'Phase Rule'	R	4	
	d)	State Sieverts law.	R	5	
	e)	Give significance of Zeroth law.	R	4	
	f)	What is Ellingham diagram?	R	5	
Q.5		Attempt any **FOUR** :			**16**
	a)	Formulate mathematical expression for combined statement of first and second law of thermodynamics.	U	3	
	b)	Calculate the standard entropy change for the following reaction at 25^0C. $Cr_2O_{3(s)} + 3C_{(s)} = 2Cr_{(s)} + 3CO_{(g)}$ Given : $S^0_{298.}\ Cr_2O_{3(s)} = 81.17 J/K/mol$ $S^0_{298.}\ C_{(s)} = 5.69 J/K/mol$ $S^0_{298.}\ Cr_{(s)} = 23.76 J/K/mol$ $S^0_{298.}\ CO_{(g)} = 197.90 J/K/mole$	A	3	
	c)	Explain the term 'Fugacity' and 'activity'.	U	3	
	d)	Explain the entropy change in reversible and irreversible processes.	R	4	
	e)	State Third law of thermodynamics. Give its significance.	R	4	
	f)	Illustrate co-relation of temperature and stability of phases in thermodynamics.	A	4	
Q.6		Attempt any **FOUR**:			**16**
	a)	State and explain Sievert's law.	U	4	
	b)	What is equilibrium constant? Write equilibrium constant for chemical reaction $A + B \leftrightarrows C + D$.	U	4	
	c)	What is metallothermic reduction process? Explain with example.	U	5	
	d)	Write the characteristics of Ellingham diagram for oxides (any eight)	A	5	
	e)	Illustrate the significance of Ellingham diagram for carbothermic reduction of oxides with the help of C-Co line on the diagram.	A	5	
	f)	Describe intersecting lines on the Ellingham diagram indicating the relative stabilities with temperature.	U	5	

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LEVEL : - **THIRD**   PROGRAM : **METALLURGY**
COURSE CODE :- **MTF302/ MG203**
COURSE NAME :- **MATERIAL TESTING.**
MAX. MARKS : 80   TIME : **3 HRS.**   DATE :- **03/ 05 / 2018**

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.
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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 MTF302	Marks
Q.1		Attempt any **FOUR**:			08
	a)	What are properties of materials?	R	1	
	b)	Explain thermal stress.	A	1	
	c)	Define hardness in metallurgy.	R	3	
	d)	Give the relation between Young's modulus, shear modulus; and Poission's ratio.	U	2	
	e)	State the relation between hardness and brittleness.	R	2	
	f)	Which test is suitable in material testing tensile or compression? (Justify)	R	2	
Q.2		Attempt any **TWO**:			16
	a)	Draw a neat and labelled stress-strain curve (tensile) and show important properties of material.	A	2	
	b)	Draw a neat sketch of UTM showing important parts and their functions.	R	3	
	c)	Draw a neat sketch and explain evaluation of properties of materials.	A	2	
Q.3		Attempt any **FOUR**:			16
	a)	What is Mechanical properties of materials (explain any four)	R	2	
	b)	Explain proof stress and its necessity.	A	2	
	c)	What is Poldi hardness testing? How is it tested?	R	3	
	d)	Describe the procedure of compression test?	U	3	
	e)	Draw a neat sketch of tensile specimen showing important dimensions.	U	3	
	f)	Describe the procedure for Rockwell hardness test.	R	3	

P.T.O.

QN	SQN	Question Text	R/U/A	Code MTF 302	Marks
Q.4		Attempt any **FOUR**:			08
	a)	What is Endurance LIMIT?	R	5	
	b)	Draw only creep curve test.	U	6	
	c)	Give classification of NDT.	R	7	
	d)	Why the surface conditions are important for fatigue life?	A	5	
	e)	Draw i) Inter granular fracture ii) Trans granular fracture.	R	6	
	f)	What is importance of NDT? (any four)	R	7	
Q.5		Attempt any **FOUR** :			16
	a)	Write down the calculation of Charpy and Izod testing.	A	4	
	b)	Write down improvements of fatigue strength.	A	5	
	c)	Draw a neat sketch and explain "creep testing"	U	6	
	d)	Draw a neat sketch and explain dye penetrations Test (DPT)	U	7	
	e)	Which surface treatments are preferred to improvement of fatigue strength? (Justify your reason)	A	5	
	f)	Write down advantages, disadvantages and applications of NDT.	R	6	
Q.6		Attempt any **FOUR**:			16
	a)	Show the arrangement of specimen mounting in charpy and izod impact tests.	A	4	
	b)	What is effects of important variables in fatigue testing?	A	5	
	c)	Draw and explain "Rupture Test".	R	6	
	d)	Draw a neat sketch and explain through transmission method.	U	7	
	e)	Explain in details factors affecting fatigue life.	A	5	
	f)	Draw a neat sketch and explain (ECT) Eddy current testing.	R	7	

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EXAM SEAT NO.

LEVEL : - **THIRD**   PROGRAM : **METALLURGY**
COURSE CODE :- **MTF303/ MTE303**
COURSE NAME :- **METALLURGICAL ANALYSIS**
MAX. MARKS : 80   TIME : **3 HRS.**   DATE :- **08/ 05 / 2018**

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 MTF 303	Marks
Q.1		Attempt any **FOUR:**			08
	a)	Enlist types of errors in analysis.	R	1	
	b)	Enlist the steps of gravimetric analysis.	A	2	
	c)	State salt effect.	U	2	
	d)	Define quantitative analysis methods with tests in it.	U	1	
	e)	Define term precipitant.	R	2	
	f)	Define the term sampling.	U	1	
Q.2		Attempt any **FOUR:**			16
	a)	Explain different precautions to be taken in chemical laboratory .	A	1	
	b)	State the merits and demerits of gravimetric analysis.	R	2	
	c)	Explain the importance of sampling in chemical analysis.	U	1	
	d)	Explain masking with suitable example.	A	2	
	e)	Distinguish between classical method of analysis and instrumental method of analysis.	R	1	
	f)	Calculate at what pH precipitate of Ferrous hydroxide [Fe $(OH)_3$] reaches completeness S_p Fe $(OH)_3 = 3.8 \times 10^{-38}$M	A	2	
Q.3		Attempt any **FOUR:**			16
	a)	Define term accuracy and precision. State its significance.	U	1	
	b)	Explain the filtration of precipitate.	R	2	
	c)	Explain the necessity of metallurgical analysis.	U	1	
	d)	What are the requirements or characteristics of precipitate?	R	2	
	e)	Explain classification of quantitative and quantitative analysis.	U	1	
	f)	What are the precautions to be taken for handling analytical balance.	A	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTF 303	Marks
Q.4		Attempt any **FOUR**:			08
	a)	Enlist various volumentric reactions. What is Neutralization reaction?	A	3	
	b)	State Role of indicator. Give two example of indicators.	U	3	
	c)	State two advantages of volumentric analysis.	A	3	
	d)	Define titrant titer and titration of solution.	R	3	
	e)	Enlist various instrument use for chemical analysis.	R	4	
	f)	State two advantages of instrumental analysis.	A	4	
Q.5		Attempt any **FOUR** :			16
	a)	Distinguish between volumetric analysis and instrumental analysis.	U	3	
	b)	Draw and explain titration curve of 25ml 0.1 N HCL solution react s with 0.1N NaOH Burette solution. Select best Indicator.	A	3	
	c)	Why titration between weak acid and weak base is avoided?	U	3	
	d)	Explain the electrogravimetric analysis.	A	4	
	e)	Explain principle and uses of vacuum emission spectrometer.	U/R	4	
	f)	Explain photocalorimeteric analysis.	A	4	
Q.6		Attempt any **FOUR**:			16
	a)	Explain the requirements of volumetric analysis.	U	3	
	b)	Explain Redox titration with one suitable example.	R	3	
	c)	Explain principle and advantage of colorimentry method.	A	4	
	d)	Enlist various types of spectrometer. Why vacuum necessary in Emission spectrometer.	U	4	
	e)	Select and explain method used for Fe-Si Alloy Analysis.	U	5	
	f)	State procedure to determine Mg level in S.G. iron.	A	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM MAY -2018
EXAM SEAT NO.

LEVEL :- **THIRD**   PROGRAM : **METALLURGY**
COURSE CODE :- **MTF304/MTE304**
COURSE NAME :- **EXTRACTIVE METALLURGY**
MAX. MARKS : 80   TIME : **3 HRS.**   DATE :- **07/ 05 / 2018**

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 MTF 304	Marks
Q.1		Attempt any **FOUR**:			08
	a)	Define i) Calcinations and ii) Roasting.	R	1	
	b)	Explain ion exchange in brief.	U	1	
	c)	Name four iron ore minerals with their chemical formulas.	R	2	
	d)	Give the constituents of blast furnace burden.	R	2	
	e)	What is mean by integrated steel plant?	U	4	
	f)	State two major types of steel making processes.	R	4	
Q.2		Attempt any **FOUR**:			16
	a)	Name different pelletization processes. Explain one process in brief.	A	2	
	b)	Explain electro refining and electro winning.	U	1	
	c)	Give constituents of blast furnace gas.	R	4	
	d)	Give advantages and disadvantages of pyrometallurgy.	U	1	
	e)	Explain i) Disc pelletizating and ii) Drum pelletization .	A	2	
	f)	Give advantages and disadvantages of induction furnace.	U	4	
Q.3		Attempt any **TWO**:			16
	a)	Draw a neat sketch of electric arc furnace, and explain its working.	A	5	
	b)	Write a detailed note on 'operation of blast furnace'.	A	3	
	c)	Explain 'Mini blast furnace and modern trends in blast furnace practice'.	U	3	

P.T.O

Q.4		Attempt any **FOUR**:			08
	a)	Draw a schematic of argon-oxygen degassing. (AOD) process.	U	6	
	b)	State advantages of WORCRA process of copper extraction.	R	10	
	c)	List any four ores of copper.	A	10	
	d)	State advantages of Electro-slag refining (ESR) process.	U	6	
	e)	List advantages of 'hydrometallurgical route of extraction of copper'.	U	10	
	f)	Explain why carbothermic reduction of aluminum is not preferred.	U	9	
Q.5		Attempt any **FOUR** :			16
	a)	Explain WORCRA process of extraction of copper	A	10	
	b)	Explain construction of ladle furnace with schematic drawing.	U	6	
	c)	Draw and explain flow-chart of hydrometallurgy of copper.	R	10	
	d)	Draw flowchart of Bayer's process used to prepare alumina from bauxite.	U	9	
	e)	Write a note on 'Argon-oxygen degassing' (~~ADO~~) (AOD) process.	A	6	
	f)	Explain 'Vacuum-oxygen degassing '(VOD) process.	A	6	
Q.6		Attempt any **TWO**:			16
	a)	Explain 'Hall-Heroult process' used in extraction of aluminium.	A	9	
	b)	Explain 'D-H process' of degassing.	A	7	
	c)	Draw a schematic diagram of curved mould type (S-shaped) continuous casting machine.	U	8	

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LEVEL: **III**

COURSE CODE: **MTF306/MG207**

MAX. MARKS: **80**

PROGRAM: **METALLURGY**

COURSE NAME: ELECTRICAL ENGINEERING AND ELECTRONICS

TIME: **3 HRS.**

DATE: **11/05/2018**

Instruction:-

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

SECTION - I

QN	S.Q.N	Question Text	Cognition Level R/U/A	Co Code (MTE 306)	Marks
Q.1		Attempt any **FOUR**			(08)
	a)	State ohm's law and its mathematical equation.	R	1	
	b)	State the advantages of electric heating. (any Two)	R	3	
	c)	Explain Faraday's laws of electromagnetic Induction.	U	1	
	d)	List the types of welding.	R	4	
	e)	Give the safety precautions used for electrical installation. (any Two)	R	5	
	f)	State the principle of attraction type moving iron instrument.	R	2	
Q.2		Attempt any **FOUR**			(16)
	a)	Explain with sketch concept of earthing & necessity of earthing.	U	5	
	b)	Describe in detail any two effects of electric current.	R	1	
	c)	Explain with neat sketch PMMC type instrument.	U	2	
	d)	Explain with neat sketch carbon arc welding.	U	4	
	e)	Describe in detail the power factor improvement and it's economics.	U	3	
	f)	Explain dielectric heating with its applications.	U	5	
Q.3		Attempt any **FOUR**			(16)
	a)	Compare AC & DC current.	U	1	
	b)	Explain with neat sketch induction type energy meter.	U	2	
	c)	Explain with neat sketch core type induction furnace.	U	3	
	d)	Explain with neat sketch Dynamometer type wattmeter.	R	2	
	e)	Explain resistance heating and state it's applications.	U	3	
	f)	Explain with neat sketch direct arc furnace.	U	3	
		SECTION - II			
Q.4		Attempt any **FOUR**			(08)
	a)	Draw symbol of following devices : i) Photodiode. ii) UJT	R	6	
	b)	Define the transducer. Give examples of it.	R	5	
	c)	Convert $(FFFF)_H$ to decimal number.	A	9	
	d)	List the types of electronic measuring instruments.	R	7	
	e)	Define : i) Conductor, ii) Semiconductor.	R	6	

(P.T.O)

	f)	Draw symbol and truth table for AND gate.	R	9	
Q.5		Attempt any **FOUR**			(16)
	a)	Explain digital multimeter with neat block diagram.	U	7	
	b)	Explain the criteria for selection of transducer.	U	8	
	c)	Convert : i) $(135)_{10} = (?)_2$, ii) $(213)_{10} = (?)_{16}$.	A	9	
	d)	Explain N-type and P-type extrinsic semiconductor with neat diagram.	U	6	
	e)	Differentiate analog instruments and digital instruments. (any Four points)	U	7	
	f)	Draw and explain temperature transducer in detail.	U	8	
Q.6		Attempt any **FOUR**			(16)
	a)	Perform subtraction of followings : i) 11011-00111, ii) 00101-01011.	A	9	
	b)	With neat block diagram explain digital voltmeter.	U	7	
	c)	Explain any one type of pressure transducer with neat diagram.	U	8	
	d)	Compare BJT and FET. (any Four points)	U	6	
	e)	Explain digital frequency meter with it's block diagram.	U	7	
	f)	Explain different types of electrical transducers by giving examples of it.	U	8	

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LEVEL: **FIFTH**   PROGRAM: **METALLURGY**
COURSE CODE: **MTE508/MG407** COURSE NAME: **ADVANCED PHYSICAL METALLURGY**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **24/05/2018**

Instruction:-
1) Answer to **two sections** must be written in separate section answer book provided.
2) Figure to the right indicates 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.

Section – I

Marks

Q.1   Attempt any **FOUR**   **(08)**

   a) Write two application of electron microscope.

   b) Write name of x-ray diffraction method.

   c) Write two properties of steel. (plain carbon)

   d) Define machinability.

   e) Write two magnetic properties.

   f) State true & false & justify your answer.' When carbon is low in steel, it increases ductility of steel'.

Q.2   Attempt any **FOUR**   **(16)**

   a) Effect of alloying element on the shape of TTT (Time Temperature Transformation) diagram.

   b) Write short note on "high alloy steel".

   c) Write not on "Electron Microscope".

   d) Write note on Micro Alloyed steel.

   e) Write application of lubrication system in machine.

   f) Write short note on Alnico Fernico.

Q.3   Attempt any **FOUR**   **(16)**

   a) Explain powdered method.

   b) Explain properties & uses of following alloying element i) Nickel ii) Chromium.

   c) Write note on HSLA steel. (High Strength low alloy steel)

   d) Write short note on metal to non-metal dry friction.

   e) Write short note on "Machinability Index" of various metal & alloy.

   f) Write four important properties required in electrical system.

P.T.O

Q.4   Attempt any **FOUR**   (08)

State True of False and Justify.

a)   Inter granular corrosion crack are observed in Austenite stainless steel.

b)   Double tempering is given to tool steels.

c)   Cutting tools surface are many times hardened by PVD.

d)   Aging treatment in necessary after solution treatment given to Aluminum copper alloys.

e)   Surgical instruments are made of martensitic stainless steel.

f)   Carburizing is a diffusion process.

Q.5   Attempt any **FOUR**   (16)

a)   Explain the H.S.S heat treatment cycle w. r. t to

    i)   Why step heating is necessary?

    ii)   The microstructural changes taking place during tempering.

b)   What is meant by stabilization of stainless steel? Why is it done?

c)   Explain martensitic stainless steel with reference to properties, microstructure and 2 applications.

d)   Explain any one type of PVD process.

e)   What are the requirements of a good cutting tool steel? Give the composition and 2 applications.

f)   Why heat treatments are important for measuring instruments?

Q.6   Attempt any **FOUR**   (16)

a)   Explain the variables which control diffusion with the help of an example.

b)   What do you mean by sensitization of austenite stainless steel? How can it be removed?

c)   Explain the precipitation hardening method with the help of an example.

d)   Explain Fick's first law of diffusion.

e)   Which properties are important at elevated temperatures? Give the composition and properties of two steels used at elevated temperature.

f)   What are the requirement of dies required for hot working dies for extrusion? Give composition of such dies.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

LEVEL : - **THIRD**   PROGRAM : **METALLURGY**
COURSE CODE :- **MTF308/MTE309**
COURSE NAME :- **MECHANICAL ENGG.**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **24/ 05 / 2018**

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 MTF 308	Marks
Q.1		Attempt any **FOUR**:			**08**
	a)	Enlist the parts of IC engine.	R	3	
	b)	Draw the conventional representation for partial section.	U	2	
	c)	Draw the conventional representation for pulley.	U	2	
	d)	Classify IC engine on the basis of i) Cylinder arrangement. ii) Method of ignition.	R	3	
	e)	Define heat transfer and state the modes of heat transfer.	U	4	
	f)	Draw the conventional representation for revolved section.	U	2	
Q.2		Attempt any **FOUR**:			**16**
	a)	State the function and materials used for the following components i) Valves ii) Crank shaft iii) Piston Ring iv) cylinder.	R	3	
	b)	Explain the types of insulation used in metal industries.	A	4	
	c)	Draw sectional orthographic view of crank shaft.	U	1	
	d)	Explain the concept of block body.	U	4	
	e)	Draw sectional orthographic view of flanged coupling.	U	1	
	f)	Explain with neat sketch the working of four stroke diesel engine.	R	3	
Q.3		Attempt any **TWO**:			**16**
	a)	Differentiate between two stroke and four stroke engine.	R	3	
	b)	Draw sectional orthographic view of pump body.	U	1	
	c)	Determine the rate of heat flow through a wall made of 3cm thick steel and covered with insulting material of 0.5cm thick. The temperature of wall inside is 300^0C & outside is 50^0C. $K_{steel} = 60$ W/m-k & $K_{insulation} = 05$ W/m-k.	A	4	

(P.T.O.)

QN	SQN	Question Text	R/U/A	Co MTF 308	Marks
Q.4		Attempt any **FOUR:**			08
	a)	Define i) Specific gravity. ii) Specific weight.	R	5	
	b)	Define i) Mass density ii) Viscosity.	R	5	
	c)	Give classification of pump.	U	7	
	d)	Write down the function of compressor.	U	7	
	e)	How the fluid pressure is controlled?	A	5	
	f)	Write any four components of hydraulic system.	R	8	
Q.5		Attempt any **FOUR** :			16
	a)	List different manometers. Describe any one.	R	5	
	b)	State the disadvantages of i) Gear drive ii) Belt drive.	R	6	
	c)	State the application of i) Rope drive ii) Gear drive.	A	6	
	d)	Describe the construction and working principle of reciprocating compressor.	U	7	
	e)	Draw a general layout of pneumatic system.	R	8	
	f)	Write down the application of i) Hydraulic system. ii) Pneumatic system.	A	8	
Q.6		Attempt any **TWO:**			16
	a)	i) A simple manometer is used to measure the pressure of oil (Sp. gravity = 0.8) flowing in a pipe line. Its right limb is open to atmosphere and left limb is connected to the pipe. The centre of the pipe is 9cm below the level of mercury (Sp. gravity = 13.6) in the right limb. If the difference of mercury level in the two limbs is 15cm, determine the absolute pressure of the oil in the pipe in kg/cm^2. ii) Differentiate between reciprocating compressor and centrifugal compressor.			
	b)	i) Write down the classification of belt drive and explain any one with neat sketch. ii) What are different types of pulleys? Explain in details.	A	6	
	c)	Draw a neat sketch of i) Meter – in – circuit. ii) Meter –out-circuit.	A	8	

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LEVEL : - **FOURTH**   PROGRAM : **METALLURGY**
COURSE CODE :- **MTF401/MTE402**
COURSE NAME :- **PHYSICAL METALLURGY-II**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **25/ 05 / 2018**

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

QN	SQN	SECTION -I	R/ U/ A	Co MTF 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What is critical cooling rate? (CCR)	R	1	
	b)	Why hypereutectoid steels (70.8%C) are heated above A_3 temperature in annealing treatment.	R	2	
	c)	Define hardenability.	R	4	
	d)	Write objectives of tempering.	R	4	
	e)	'Low carbon steels (< 0.3%C) are suitable for hardening treatment'. State true or false & justify.	R	3	
	f)	What is boimite?	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Define austenite and pearlite.	R	1	
	b)	Draw T.T.T. diagram of hypoeutectoid steel.	R	1	
	c)	State objectives of annealing.	U	2	
	d)	Enlist different quenching media. State properties of water as a quenching media.	R	3	
	e)	Explain the procedure for determination of hardenability by Jominy End Quench Test.	U	4	
	f)	'Tempering is necessary after hardening'. Give reasons.	U	4	
Q.3		Attempt any **FOUR:**			**16**
	a)	Describe the process of nucleation and growth of ferrite and cementite during formation of pearlite on slow cooling.	U	1	
	b)	State the effect of carbon content and alloying elements on martensitic transformation of steels.	A	1	
	c)	Enlist different methods of quenching. Explain spray quenching.	U	3	
	d)	Explain the use of hardenability curves, for designing of hardening treatment in industry.	A	4	
	e)	What is meant by Temper embrittlement? How it can be eliminated?	U	4	
	f)	Explain the mechanism of heat removal during quenching.	U	3	

(P.T.O.)

QN	SQN	SECTION -II	R/U/A	Co MTF 402	Marks
Q.4		Attempt any **FOUR:**			08
	a)	Enlist carburizing method.	R	6	
	b)	Write two advantage of nitriding method.	U	6	
	c)	Write two advantages of Laser hardening method.	R	7	
	d)	How much carbon percent in cast iron and steel?	R	7	
	e)	Write two safety rules and precautions taken in H.T. shop.	U	8	
	f)	Give two differences between ferrous and non ferrous metals.	U	10	
Q.5		Attempt any **FOUR** :			16
	a)	Define carburizing method and explain any one.	U	6	
	b)	Explain plasma nitriding method with advantage.	U	6	
	c)	Explain electrolytic bath hardening method with advantage and limitation.	U	7	
	d)	Enlist flame hardening methods and explain any one in details.	A	7	
	e)	Explain heat treatment of gray cast iron.	A	8	
	f)	Explain Coherent lattice theory.	U	9	
Q.6		Attempt any **FOUR:**			16
	a)	Distinguish between Nitriding and carburizing method.	U	6	
	b)	Explain carbonitriding method.	U	6	
	c)	Distinguish between Laser hardening and induction hardening.	U	7	
	d)	Write property developed after case hardening.	U	6	
	e)	Explain Al-Si modification curve.	A	9	
	f)	Explain effect of annealing on cold working metals.	A	9	

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LEVEL :- FOURTH   PROGRAM : METALLURGY
COURSE CODE :- MTF402/MG303/MTE403
COURSE NAME :- FOUNDRY TECHNOLOGY - II
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 23/ 05 / 2018

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

QN	SQN	SECTION -I	R/U/A	Co MTF 402	Marks
Q.1		Attempt any **FOUR**:			08
	a)	State two techniques to improve directional solidification.	U		
	b)	Give two important functions performed by gating system.	U		
	c)	What is directional solidification?	R		
	d)	What is choke in gating system explain with formula?	A		
	e)	Write the molding practice for Grey cast iron.	A		
	f)	What is meant by alloy steel?	R		
Q.2		Attempt any **FOUR**:			16
	a)	Describe with neat sketch various parts of gating system, indicating the function of each.	U		
	b)	Explain the parameters which affects pouring time of a casting.	R		
	c)	Describe the function of feeders.	A		
	d)	Define inoculation. List the composition of major inoculants used. How does cell count influence properties of cast iron?	U		
	e)	Explain Mg recovery in S.G. Iron production.	U		
	f)	Discuss the effect of Si, Mo, Ni, Co on steel casting.	A		
Q.3		Attempt any **FOUR**:			16
	a)	Differentiate between pressurised and non pressurized gating system.	R		
	b)	State Bernoulli's theorem. Explain meaning of different terms and their significance.	A		
	c)	Explain Chuorinov's Rule for designing of riser.	A		
	d)	Give the classification of S.G. Iron. What are the advantages of S.G. Iron?	R		
	e)	What is carbon equivalent and how does it effects the various properties of cast iron.	R		
	f)	Explain casting characteristics of steel.			

(P.T.O.)

QN	SQN	SECTION -II	R/U/A	Co MTF 402	Marks
Q.4		Attempt any **FOUR:**			08
	a)	State two properties and two uses of copper castings.	U	6	
	b)	State various sources of O_2/H_2 absorption by copper melt.	R	6	
	c)	Why degassing necessary in Al-casting production?	R	5	
	d)	Write the advantages of Al-alloy	U	5	
	e)	Enlist various casting defect associate with gas absorption.	U	7	
	f)	State general causes of casting defect.	A	7	
Q.5		Attempt any **FOUR** :			16
	a)	Enlist various degassing method for removal of H_2 from Al.melt. Explain advantages of purging method.	U	6	
	b)	Why modification of Al-Si alloy casting necessary? Which element use as modifier?	A	6	
	c)	What is grain refinement? What is achievement after grain refinement?	A	6	
	d)	Explain various problem associates with copper melt production.	R	6	
	e)	Discuss the melting and moulding practices for copper alloy.	R/U	6	
	f)	Explain causes and remedies for slag inclusion defect.	U	7	
Q.6		Attempt any **FOUR:**			16
	a)	Explain any two defect associate with surface.	U	7	
	b)	Explain causes and remedies for hot tear defect.	U	7	
	c)	Enlist various internal defect. What is mean by sand inclusion?	U	7	
	d)	Explain cold shut.	U	7	
	e)	Write the various application of Al alloy.	A	5	
	f)	Mention some important alloy of copper and their composition and application.	A/U	6	

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EXAM SEAT NO.

LEVEL : - THIRD   PROGRAM : METALLURGY
COURSE CODE :- MTF307/MG209/MTE308
COURSE NAME :- PHYSICAL METALLURGY-I
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 21/ 05 / 2018

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 MTF 307	Marks
Q.1		Attempt any **FOUR**:			08
	a)	State lever rule.	R	2	
	b)	Define eutectic reaction.	R	2	
	c)	Define atomic packing factor (A.P.F.)	R	1	
	d)	State allotropy of pure iron.	R	3	
	e)	Write the importance of mounting metallurgical samples.	U	4	
	f)	Define 'phase'.	R	1	
Q.2		Attempt any **FOUR**:			16
	a)	Differentiate between solid solution and intermetallic compounds.	U	1	
	b)	Explain the difference between metallurgical and biological microscope.	U	4	
	c)	Explain the effect of carbon percentage on the properties of steels.	A	3	
	d)	Describe nucleation and growth of crystals.	A	1	
	e)	Calculate the atomic packing factor for face centered cubic structure.	A	1	
	f)	Explain in brief i) Pearlite ii) Miller indices.	U	3	
Q.3		Attempt any **TWO**:			16
	a)	Draw a neat sketch of Fe-C equillibrium diagram showing all the phases, critical temperatures and critical compositions. Explain cooling of 0.4% carbon steel on the Fe-C equillibrium diagram showing the transformations in micro structure.	A	3	
	b)	Describe imperfections in crystal structures with neat sketches.	U	1	
	c)	Construct equillibrium diagram for the elements having complete solubility in liquid state and complete insolubility in solid state.	A	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTF 307	Marks
Q.4		Attempt any **FOUR**:			08
	a)	What are cast irons?	R	5	
	b)	State applications of gray cast iron.	A	5	
	c)	Define Bronzes. Write applications of phosphor bronzes.	R	6	
	d)	State composition and properties of Duralumin.	R&U	6	
	e)	State classification of bearing alloys.	R&U	6	
	f)	Define babbits. Write its applications.	R&U	6	
Q.5		Attempt any **FOUR** :			16
	a)	Explain with neat diagram graphite flakes types in gray cast iron.	U & A	5	
	b)	Describe the factors which control graphitization in cast iron (any two)	U	5	
	c)	Draw and explain Cu-Zn equilibrium diagram in details.	R	6	
	d)	Write composition, properties and applications of Beryllium bronzes.	R&U	6	
	e)	Why modification of Al alloys is done? How it is done?	R&U	6	
	f)	Write composition and uses of LM-13 and LM-6 SERIES.	U	6	
Q.6		Attempt any **FOUR**:			16
	a)	What is equivalent carbon in cast iron?	U	5	
	b)	Which factors affect the properties of a gray cast iron? Write properties of gray CI.	U & A	5	
	c)	Explain hot working of brasses.	R& A	6	
	d)	State the cause of orange peel defect? How it can be eliminated.			
	e)	What is the effect of Cu addition on microstructure of babbits.	A	6	
	f)	Write applications of composition of lead based and in baaed babbits.	A	6	

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LEVEL : - THIRD   PROGRAM : METALLURGY
COURSE CODE :- MTF307/MG209/MTE308
COURSE NAME :- PHYSICAL METALLURGY-I
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 21/ 05 / 2018

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 MTF 307	Marks
Q.1		Attempt any **FOUR**:			08
	a)	State lever rule.	R	2	
	b)	Define eutectic reaction.	R	2	
	c)	Define atomic packing factor (A.P.F.)	R	1	
	d)	State allotropy of pure iron.	R	3	
	e)	Write the importance of mounting metallurgical samples.	U	4	
	f)	Define 'phase'.	R	1	
Q.2		Attempt any **FOUR**:			16
	a)	Differentiate between solid solution and intermetallic compounds.	U	1	
	b)	Explain the difference between metallurgical and biological microscope.	U	4	
	c)	Explain the effect of carbon percentage on the properties of steels.	A	3	
	d)	Describe nucleation and growth of crystals.	A	1	
	e)	Calculate the atomic packing factor for face centered cubic structure.	A	1	
	f)	Explain in brief i) Pearlite ii) Miller indices.	U	3	
Q.3		Attempt any **TWO**:			16
	a)	Draw a neat sketch of Fe-C equillibrium diagram showing all the phases, critical temperatures and critical compositions. Explain cooling of 0.4% carbon steel on the Fe-C equillibrium diagram showing the transformations in micro structure.	A	3	
	b)	Describe imperfections in crystal structures with neat sketches.	U	1	
	c)	Construct equillibrium diagram for the elements having complete solubility in liquid state and complete insolubility in solid state.	A	2	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MTF 307	Marks
Q.4		Attempt any **FOUR**:			08
	a)	What are cast irons?	R	5	
	b)	State applications of gray cast iron.	A	5	
	c)	Define Bronzes. Write applications of phosphor bronzes.	R	6	
	d)	State composition and properties of Duralumin.	R& U	6	
	e)	State classification of bearing alloys.	R& U	6	
	f)	Define babbits. Write its applications.	R& U	6	
Q.5		Attempt any **FOUR** :			16
	a)	Explain with neat diagram graphite flakes types in gray cast iron.	U & A	5	
	b)	Describe the factors which control graphitization in cast iron (any two)	U	5	
	c)	Draw and explain Cu-Zn equilibrium diagram in details.	R	6	
	d)	Write composition, properties and applications of Beryllium bronzes.	R& U	6	
	e)	Why modification of Al alloys is done? How it is done?	R& U	6	
	f)	Write composition and uses of LM-13 and LM-6 SERIES.	U	6	
Q.6		Attempt any **FOUR**:			16
	a)	What is equivalent carbon in cast iron?	U	5	
	b)	Which factors affect the properties of a gray cast iron? Write properties of gray CI.	U & A	5	
	c)	Explain hot working of brasses.	R& A	6	
	d)	State the cause of orange peel defect? How it can be eliminated.			
	e)	What is the effect of Cu addition on microstructure of babbits.	A	6	
	f)	Write applications of composition of lead based and in baaed babbits.	A	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM MAY -2018
EXAM SEAT NO.

LEVEL : - **FIFTH**   PROGRAM : **METALLURGY**
COURSE CODE **MTE503/MG402**
COURSE NAME :- **INDUSTRIAL ORGANIZATION & MANAGEMENT**
MAX. MARKS : 80   TIME : **3 HRS.**   DATE :- **14 / 05/ 2018**

Instruction :-
1) Answer to 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	SQN	Section- I	Marks
Q.1		Attempt any **FOUR:**	08
	a)	Define vision and mission.	
	b)	Write the types of decisions.	
	c)	What is meant by motivation?	
	d)	Define limited 'Liability'.	
	e)	Write limitations of undertaking.	
	f)	What is decision making?	
Q.2		Attempt any **FOUR:**	16
	a)	State the qualities required for leadership.	
	b)	What is mean by effective controlling?	
	c)	Compare partnership with proprietorship.	
	d)	Give advantages and limitations co-operative organization.	
	e)	Describe SWOT analysis in decision making.	
	f)	Explain the types of decision support systems.	
Q.3		Attempt any **TWO:**	16
	a)	Define management and give its principles.	
	b)	Describe the levels of management with their mutual relations.	
	c)	Explain the conditions those influence decision making with suitable example.	

P.T.O.

QN	SQN	Section- II	Marks
Q.4		Attempt any **FOUR:**	**08**
	a)	Enlist four financial institutions.	
	b)	Why working capital is required?	
	c)	Enlist the various provisions in pollution control act.	
	d)	What are safety codes?	
	e)	Define two time estimates used in network analysis.	
	f)	Give four advantages of linear programming techniques.	
Q.5		Attempt any **TWO:**	**16**
	a)	Explain the EOQ, reordering quantity, reordering time using figure.	
	b)	Define material handling. Explain its importance. Enlist various material handling devices used in foundry.	
	c)	Differentiate clearly between over capitalization and under capitalization.	
Q.6		Attempt any **TWO:**	**16**
	a)	Define accident. Explain the main causes and remedies for accidents.	
	b)	What is ERP? How it is different from MRP? Give advantages and limitations of ERP.	
	c)	A small scale foundry unit carries six activities as indicated in table.	

Sr. No.	Activity	Period in days
1	1-2	04
2	2-3	06
3	3-5	08
4	2-4	03
5	4-5	07
6	5-6	05

Draw network diagram. And show critical path and find out project duration.

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LEVEL : - **FIFTH**　　　　PROGRAM : **METALLURGY**
COURSE CODE **MTE505**
COURSE NAME :- **INDUSTRIAL ENGINEERING**
MAX. MARKS : **80**　TIME : **3 HRS.**　DATE :- **21 / 05/ 2018**

Instruction :-
1) Answer to 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	SQN	Section- I	Marks
Q.1		Attempt any **FOUR:**	**08**
	a)	Define production and productivity.	
	b)	Enlist various types of production systems.	
	c)	What is cellular layout?	
	d)	Enlist four factors affecting process planning.	
	e)	What is progressive control?	
	f)	What is line balancing?	
Q.2		Attempt any **TWO:**	**16**
	a)	Define Break even analysis. How it is calculated?	
	b)	Explain the process of combining operations. How inspection stages are selected?	
	c)	Define i) Plant capacity　　ii) Machine capacity　iii) Plant efficiency　iv) process planning.	
Q.3		Attempt any **TWO:**	**16**
	a)	Explain the various factors affecting site selection. How Government policies helps for development of Backward areas.	
	b)	Enlist various material handling devices. Explain the selection of various material handling devices for animated foundry.	
	c)	Describe Routing, Sequencing, Scheduling and dispatching.	

P.T.O.

QN	SQN	Section- II	Marks
Q.4		Attempt any **FOUR**:	08
	a)	State the advantages of micro-motion study.	
	b)	What do you mean by Economic Order Quantity?	
	c)	State the types of jigs.	
	d)	What is locator? State the types.	
	e)	State the advantages of rapid prototyping.	
	f)	What is brain storming?	
Q.5		Attempt any **FOUR**:	16
	a)	Explain the methods of inventory management.	
	b)	State the benefits of material requirement planning.	
	c)	What is ergonomics? State the objectives.	
	d)	State the limitations and applications of work sampling.	
	e)	What are the general principles of jig and fixture design?	
	f)	Explain the construction of multiple activity charts.	
Q.6		Attempt any **TWO**:	16
	a)	What are the procedural steps involved in analytical estimating? State advantages and applications of it.	
	b)	i) The rate of use of raw material is 20 units/year. The cost of placing and receiving an order is Rs. 40. The cost of each unit is Rs/ 100. The cost of carrying inventory in percent/year is 16 which depends on the average stock. Calculate EOQ. ii) How inventory is related to cost optimization?	
	c)	Discuss the mechanism of Poka Yoke and the characteristics of Poka Yoke.	

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