GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MTE304/MG205** COURSE NAME: **EXTRACTIVE FERROUS METALLURGY**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **28/11/2016**

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.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

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

a) What is Damascus steel?
b) Give two ancient monuments in India, which prove the competency in steel making.
c) Give the parameters for selection of flux in the blast- furnace.
d) What is ore dressing? State its purpose.
e) Give typical composition of flue gases of blast furnace.
f) Name four iron and steel plants in India.

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

a) Describe the parameters for evaluation of iron ores.
b) Explain the working of drum-pelletizer.
c) Give the advantages and disadvantages of integrated steel plants.
d) Give the requirements of properties of coke for blast furnace.
e) State typical compositions of charge and pig-iron produced in blast furnace.
f) Describe the role of flux in blast furnace.

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

a) Draw a neat sketch of blast furnace and show major parts.
b) Describe the effect of increased top pressure of blast furnace.
c) Explain various chemical reactions occurring in blast furnace.

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

a) State the principle of Bessemer converted process.
b) Define the primary & secondary steel making.
c) State the principle in direct & Indirect arc furnace.
d) State major steel plants in India.
e) Write the Raw materials used for steel making.
f) Explain deoxidation of steel.

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

a) Explain construction of open hearth process.
b) Describe Indirect arc furnace with advantages.
c) Describe the V.O.D process for decarburssation of steel.
d) Explain CLU process for refining of steel.
e) Explain vertical type continuous casting process.
f) Describe the L.D process for steel making.

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

a) Explain the Induction furnace melting with construction & operation.
b) Describe the Bessemer converter process with construction& operation.
c) Explain a) Vacuum treatment b) Acid & Basic steel making.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE306**

COURSE NAME :- **FOUNDRY TECHNOLOGY - I**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **30 / 11 / 2016**

Instruction:-

1) Answers must be written in the main answer book provided.(and supplements if required)
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.

Marks

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

a) Define the core. State the types of cores.

b) What is pit moulding?

c) What are the additives? State their functions.

d) State the types of foundries. Explain in one sentence each.

e) What are the colour codes used for different areas of pattern and core box?

f) What are the different sand tests are performed on green sand.

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

a) What are the stages in the manufacturing of a casting? State the advantages.

b) Explain the effect of moisture and clay content on green compressive strength.

c) Explain the mould coatings and mold washes with advantages.

d) What is the purpose of Venting? Write the effect of improper venting on casting.

e) Explai the loam sand molding.

f) What are the factors considered during designing and construction of pattern?

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

a) Explain Shellmoulding process with respect to principle, ingradients, advantages and applications.

b) Explain CO_2 process with mechanism, principle, ingredients and advantages, disadvantages.

c) Explain the investment casting process stepwise with advantages and disadvantages.

(P.T.O.)

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

a) State the principle of centrifugal casting process.

b) What is meant by 'Die' used for castings?

c) What are the advantages of pit molding?

d) List the stage during working of capola furnace.

e) How the arc is struck between the electrodes of electric arc furnace?

f) Electric induction furnace (coreless) is considered to be cleanest melting furnace. Why?

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

a) Why Gravity die casting is also called as pressureless die casting? Explain the simple design of a die with neat fligure.

b) Explain the construction and working of a Air injection type hot chamber die casting machine.

c) Explain two parts and three parts No bake molding process in brief.

d) Draw a neat sketch of cupola furnace showing all the parts and d ifferent zones.

e) Explain the working of a direct arc furnace. State its applications.

f) Suggest a suitable molding process for an electric motor body. Justify your selection.

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

a) Explain the working, advantages and applications of continous casting.

b) What is meant by Stack molding? Why it is advantages over conventional cope and drag molding?

c) Explain in brief plaster molding and ceramic molding processes.

d) What are the operational cares to be taken for temperature control and composition control in cupola furnace?

e) Compare core type and coreless induction furnaces with respect to working principle, construction, advantages and limitations.

f) Suggest and justify a molding process for manufacture of lathe bed.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: THIRD | PROGRAM: METALLURGY

COURSE CODE: MTE310/MG401 | COURSE NAME: METAL JOINING PROCESSES

MAX. MARKS: 80 | TIME: 3 HRS. | DATE: 03/12/2016

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.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

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

a) Enlist various metal forming processes.

b) Show a carbursing flame with a neat sketch.

c) State the principle of arc welding.

d) Write about consumable electrodes.

e) State two advantages of electron beam welding.

f) What LASER stands for?

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

a) Classify welding processes.

b) Describe gas welding techniques

c) Enlist the function of coating materials provided on electrodes

d) Enlist the advantages of gas welding.

e) Write about filler material and fluxes used in gas welding.

f) Describe high pressure welding torch with a neat sketch.

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

a) Describe MIG welding processes.

b) Describe shielded arc welding with sketch.

c) Enlist advantages and limitations of TIG welding.

d) Enlist applications of resistance welding.

P.T.O

e) Describe laser beam welding.

f) Sketch a friction welding machine. Enlist materials that can be welded with friction welding.

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

a) Draw a corner joint and Tee joint.

b) Why pretreatment necessary before welding

c) List various pretreatment use before attempt of

d) List various welding position

e) Define term 'weldability'

f) Define term 'soldering'. State its one use.

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

a) Explain 'Heat Affected Zone'. How it is minimize.

b) What is mean by 'soft solder'? State its properties.

c) State composition and properties of any two solder alloys.

d) Define 'Brazing'. List various method of Brazing. State any one method in detail.

e) State various destructive testing method of weld soundness. Explain microscopic method.

f) Explain radiography testing of weld in term of working & conclusion.

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

a) State any two metallurgical welding defect in term of causes and remedies.

b) Explain advantages and application of Electrochemical machining process.

c) Explain working of Electro-discharge machining.

d) Explain role of electrolyte in electrochemical machining. Why dc supply necessary?

e) List various forging process. State advantage of cold forging

f) Why is annealing not required after hot forging or hot working?

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **METALLURGY**

COURSE CODE: **MTE101/MG202** COURSE NAME: **FURNACES REFRACTORIES & PYROMETRY**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **03/12/2016**

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.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

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

a) Show various zones of flame.

b) Write the disadvantages of indirect arc furnace.

c) What is regenerator?

d) Write the occurance of coal in India.

e) Write the change composition of cupola furnace.

f) What is blast furnace gas? Write its applications.

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

a) What are the types of carbonization of coal? Explain any one.

b) Enlist various types of gaseous fuels. Write their advantages & disadvantages.

c) Draw a neat sketch of direct arc furnace. Write its disadvantages.

d) Explain refining of petroleum.

e) Differentiate between solid fuels & liquid fuels.

f) Explain i) Reverberatory furnace ii) Brignetted coke

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

a) What is meant by LPG? How it is obtained. Write its advantages

b) Explain working of any 'burner'.

c) What is the principle of induction furnace? Explain construction of coreless induction furnace.

d) Explain classification of coal.

e) Differentiate between Regenerators & Recuperator.

f) Explain i) coke oven gas ii) Bi-products of coke.

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

a) Define term' Refractoriness'

b) State different types of refractory with one example.

c) What is specialty of synthetic refractory?

d) Write down chemical formula of fireclay refractory. State its nature.

e) Define term thermometry & give one example.

f) Define term 'pyrometry'

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

a) List various method used to testing of refractory. What is conclusion of PCE test?

b) Why porosity measurement is important?

c) Write two properties and application of silica Refractory.

d) Explain effects of slag on Refractory. How it is minimized?

e) What is mean by basic refractory? where basic refractory used in application?

f) Write a short note on 'Alumina refractory'.

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

a) Distinguish between Thermometry & pyrometry.

b) Write down working principle of metal expanding thermometer.

c) What is mean by Nobel thermocouple?

d) Write down working and application non contact type pyrometer.

e) Explain 'seeback effect'

f) Write down factor for selection of refractory.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE308/MG209/MT209**

COURSE NAME :- **PHYSICAL METALLURGY-I**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **02 / 12 / 2016**

Instruction:-

1) Answers must be written in the main answer book provided.(and supplements if required)
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.

Marks

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

a) Draw schematic sketch and give the meaning of the structure HCP with two examples.

b) What is the meaning of Miller indiees for planes?

c) State Gibb's phase rule with meaning of different terms.

d) What is monotectic reaction?

e) Draw a schematic cooling curve of a pure metal with proper names of axes, from liquid to solid sttate.

f) What transformation takes place at about 1400^0C in pure iron while cooling? State the structures.

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

a) Explain the concept of co-ordination number and find the co-ordination number of simple cubic and body centred cubic structures.

b) State Hume Rothery rules with examples whereever feasible.

c) Explain the process and mechanism of nucleation and growth. What are necessary driving forces for this mechanism? Explain in brief.

d) Explain the process of construction of binary equilibrium diagram for an insomorphous system like Cu-Ni.

e) What is eutectoid reaction? Draw an iron carbon equilibrium diagram showing only eutectoid reaction, composition, phases and temperatures.

f) What is eutectic reaction? Show iron carbon equilibrium diagram showing only the eutectic reaction compositions, phases, and temperatures.

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

a) What is poly-morphism? How is it related to allo-tropy? Give few examples of allotropy?

b) What are different types of solid solutions? Explain with meaning along with itermetallic compounds.

(P.T.O.)

c) State modified Gibb's phase rule and apply it to different portion of cooling curves for pure metals from liquid to solid.

d) Take an example of an isomorphous system and illustrate changes in microstructure during cooling of an alloy and illustrate the properties of different constituents with leve. rule.

e) Draw microstructures of plain carbon steel with 0.2%C and 0.6%C showing proportions of phases.

f) How composition affects percentage proportions of phases in steels (plain carbon), illustrate also the changes in properties.

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

a) Why white cast iron are known as white? Write its applications.

b) Write the chemical composition and applications of phosphor bronze.

c) What are yellow brasses? Write its properties.

d) What is the classification of bearing alloys? Draw microstructure of any one type of bearing alloy.

e) Why cast irons show better damping capacity?

f) What is graphitization in cast irons?

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

a) Explain modification of Al-Si alloys.

b) Draw a neat sketch of Cu-Zn equillibrium diagram up to 60%Zn. Show variations in their mechanical properties.

c) Write the principle requirements of bearing metals.

d) Differentiate between S.G. iron and Malleable iron.

e) Draw neat sketches of types of Grey cast irons. Which type of Grey cast iron is most desireble?

f) Explain season cracking of brasses. How to avoid it?

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

a) Differentiate between tin based and lead based babbits.

b) Why Grey cast iron is considered as most castable alloy?

c) Write chemical composition, properties and applications of duralumin alloy.

d) What is carbon equivalent? What is the significance of carbon equivalent in cast irons?

e) Write chemical composition properties and applications of following alloys (any two) i) Aluminium bronze ii) Gun metal iii) LM 6 iv) Beryllium bronze.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE303/MG204**

COURSE NAME :- **METALLURGICAL ANALYSIS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **24 / 11 / 2016**

Instruction:-

1) Answers must be written in the main answer book provided.(and supplements if required)
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.

Marks

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

a) Define qualitative and quantitative analysis.

b) What is a standard solution?

c) What is an error in measurement?

d) Define sample.

e) Name four glassware used in laboratory.

f) Explain masking of an ion.

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

a) Compare gravimetric analysis with volumetric analysis on four points.

b) Define solubility and state ways to express it.

c) Describe the requirements of precipitated form.

d) What is solubility product? State its significance.

e) State various balances with their accuracy, simplicity and application areas.

f) Describe the process for preparation of standard solution.

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

a) Explain the method of sampling of liquid metal.

b) State and compare different errors.

c) 1.6 g sample of brass was analized for its copper content. At the end of the analysis CuSO4 precipitate was found to weigh 2.49g. Find out the copper percentage in the given sample. (At. wts-C_u- 63.50; S-32.50;0-16)

[P.T.O.]

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

a) Define the Lambert's and Beer law.

b) Define the neutralisation reaction.

c) State the principle of combution method for carbon analysis.

d) Write down the principle of spectro meter used in industry.

e) Name the four important indicators used in volumetric analysis with pH range.

f) State the Normality and equivalent weight.

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

a) What is titration curve? Draw a titration curve for strong acid and strong base and explain.

b) Define indicator. Name the four important indicators with pH range and explain the choise of indicator.

c) Define the volumetric analysis & give the requirements of it.

d) State the types of titration. Explain acid-base titration.

e) Explain electrogravimetric analysis with diagram.

f) Name types of instrumental analysis and state the advantages and disadvantages of it.

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

a) Explain the emmision spectrometer with process, principle & diagram and advantages.

b) What is principle of color measurement (comparison). State the methods of color comparison and explain the photoelectric calorimeter with diagram.

c) Explain i) Redox titration (Oxidation-Reduction)
ii) Advantages of potentiometric titration.

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE503/MG402/MT404**

COURSE NAME :- **IND. ORGANIZATION & MANAGEMENT**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **19 / 11 / 2016**

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.

Section – I

Marks

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

a) What is main function of management?

b) Why planning is necessary in management?

c) List Basic types of decision.

d) List advantages of co-operative sector.

e) What is Risk?

f) Why innovativedicision is important?

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

a) List four scopes of management.

b) What is communication? List four means of communication.

c) Why planning is considered as competencies? Explain.

d) List Basic types of Decisions and explain any one.

e) What are the handals in effective communication?

f) What is creative and effective control?

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

a) List the different forms of business organisation. Explain any two.

b) Explain the concept of Decision Making and explain rational Decision Making.

c) What is decision support system? Explain role of support system in brief.

P.T.O

Section – II	Marks

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

a) Define the term 'lead time'.

b) Define 'inventory'.

c) Give the long form of PERT & CPM.

d) Define the term 'slack'.

e) Enlist various time estimates.

f) List advantages of linear programming techniques.

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

a) List various material handlling equipments. Describe the equipment used to carry materials for long distance.

b) Give formula for EOQ and describe various terms connected with it.

c) What is MPS? Enlist its advantages.

d) Define working capital. What is buffer stock?

e) Differentiate between shares and debentures.

f) Define 'finance'. State its importance.

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

a) Write about occupational safety and health administration.

b) Define 'accident'. Enlist causes of accidents.

c) Write about workmen compensation act.

d) Describe BPR in brief.

e) Differentiate between PERT & CPM.

f) Draw a simple network and describe various terms connected with it.

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE307/MG207**

COURSE NAME :- **ELECTRICAL ENGINEERING & ELECTRONICS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **18 / 11 / 2016**

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.

Section – I

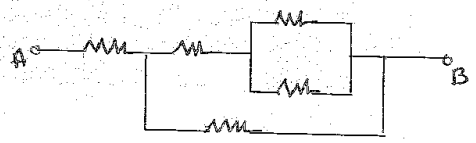
Marks

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

a) State Ohm's law.
b) Give two examples where heating effect of electric curent is used.
c) State one important disadvantage of PMMC instruments.
d) What are the types of electric heating?
e) Why it is necessary to improve the power factor?
f) What are the different types of wires?

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

a) Find R_{AB} assuing each resistance of 4Ω



b) Explain working of any one type of M.I. type instrument with neat diagram.
c) Draw neat diagram to show how ammeter, voltmeter and wattmeter can be connected in the circuit.
d) Explain the working of resistance oven.
e) What is dielectric heating? Explain its working principle.
f) What are the types of welding? Give typical applications of arc welding.

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

a) Define work, power and energy and state their units.
b) Explain working of single phase induction type energy meter.
c) Explain the principle of electric heating and give their advantages.
d) Give any four applications of electric heating.
e) Explain resistance welding with neat diagram.
f) Define earthing. State its necessicity. Explain any one type with neat diagram

P.T.O.

Section – II

Marks

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

a) Draw symbol and truth table for AND gate.
b) Convert $(FFFF)_H$ to decimal number.
c) State function of transducer.
d) Enlist various electric transducers.
e) Draw symbol for PN- junction diode and zener diode.
f) Draw the V-I characteristics of zener diode.

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

a) Convert $(135)_{10}$ & $(89)_{10}$ to binary numbers.
b) Draw and explain construction of zener diode.
c) Explain the types of electrical transducers.
d) Explain digital frequency meter with its block diagram.
e) Give criteria to selet transducers in Mettalurgical engineering.
f) Enlist various advantages of electronic measuring instruments.

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

a) Draw and explain working prinicple MOSFET in detail.
b) With neat block diagram explain digital voltmeter.
c) Differentiate analog instruments and digital instruments.
d) Explain any one type of pressure transducer with neat diagram.
e) Draw and explain temperature transducer in detail.
f) Convert 1) $<\underline{F2}>H$ into binary equivalent and
2) $(\underline{213})_{10}$ into Hexadecimal equivalent numbers

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE309/MG206/MT206**
COURSE NAME :- **MECHANICAL ENGINEERING**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **05 / 12 / 2016**

Instruction:-
1) Answers must be written in the main answer book provided.(and supplements if required)
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.

Marks

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

a) Draw the conventional representation of removed section.

b) What is the purpose of insulation?

c) State the materials used for manufacturing crankshaft and piston rings.

d) Draw the conventional representation of offset section.

e) State any two applications of heat transfer in metallurgy.

f) State the function of connecting rod and piston.

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

a) Draw the sectional orthographic view of camshaft.

b) Draw the conventional representation of flywheel.

c) How internal combustion engines are classified?

d) Explain any four insulating materials.

e) Differentiate between S.I. and C.I. engine.

f) Define conduction and convection with suitable example of each.

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

a) Explain with neat sketch, working of 2-stroke diesel engine.

b) Draw the sectional orthographic view of pump body.

c) State the mechanisms of heat transfer by conduction and solve the following Estimate the heat loss through a red brick wall of length 5m, height 4m & thickness 0.25m, if the temperatures of the wall surfaces are maintained at 110^0C & 40^0C respectively.
K_{brick} = 0.70 W/mK.

(P.T.O.)

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

a) Define i) Mass density ii) Viscosity.

b) What is vapour pressure?

c) Give the types of belt drives.

d) Write the function of compressor.

e) How the pumps are classified?

f) Write any four components of hydraulic system.

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

a) Explain the terms -: i) surface Tension ii) compressibility.

b) State the applications of i) Gear drive ii) chain drive.

c) Draw a general layout of pneumatic system.

d) Explain the basic principle of flow control valve.

e) Describe the construction and working principle of reciprocating compressor.

f) Differentiate between reciprocationg compressor and centrifugal compresor. (any four points)

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

a) 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 the 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.

b) i) Write advantages and disadvantages of gear drives.
ii) What are the applications of rope drive?

c) Explain with neat lebelled sketch meter in and meter out circuits.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MTE409** COURSE NAME: **FURNACE TECHNOLOGY**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **30/11/2016**

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) Define the refractories

b) What are the types of fuels? Give one example each.

c) State various types of cupola.

d) What is water gas?

e) State two properties of acid refractories

f) What is calorific value? State the effect of carbon on C.V fuel.

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

a) Explain testing of refractories in brief, any one method.

b) Describe the construction & operations of convensional cupola.

c) Explain role of carbon as fuel & refractory in furnace.

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

a) State the types of refractories. Explain the acid refractories with application.

b) Explain recuperation & regeneration with their specific application.

c) Describe 'Rotary furnace' construction & working.

d) On what factors, the selection of burner depends. Explain any two liquid fuel burners.

e) Explain different heat transfer modes.

f) Explain heat recovery from the furnace.

P.T.O

Section – II

Marks

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

a) State the principle of resistance heating.

b) Classify different methods of electrical heating w.r.t the frequency of current.

c) List various material used as heating elements in resistance furnaces.

d) What is skin effect?

e) State role of electrodes in electric arc furnace

f) State the principle of heating in core type induction furnace.

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

a) What are the advantages of direct resistance heating over indirect resistance heating?

b) Explain the significance of resistance coil dimensions in furnace design.

c) Explain the working of vacuum induction furnace.

d) Describe the calculation of frequency in induction furnace.

e) Why degassing is necessary? Which are the various methods of degassing?

f) Compare lift out and Tilting type crucible melting furnaces.

Q.6 Explain the following furnaces (any four) with neat diagram, working principle, construction and applications. **(16)**

a) Indirect resistance furnace

b) Salt bath furnace

c) Direct arc furnace

d) Core type induction furnace

e) Ajax watt furnace

f) Reverberatory furnace

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FIFTH PROGRAM: METALLURGY

COURSE CODE: MTE505/MG210/MT309 COURSE NAME: INDUSTRIAL ENGINEERING

MAX. MARKS: 80 TIME: 3 HRS. DATE: 17/11/2016

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) How productivity of raw material is measured?

b) Enlist various elements of cost.

c) Define plant layout.

d) What information is required to be filled in operation sheet?

e) What is scheduling?

f) Give advantages of Gantt Chart.

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

a) Explain various production systems with their merits, demerits & applications.

b) Explain the planning of processes from raw material to finished product for a medium scale steel foundry.

c) Describe various technique of assembly planning and explain types of assembly.

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

a) Classify various material handling devices and Explain AGV's

b) Explain Group technology and cellular layout. Compare their applications.

c) Explain Routing, sequencing, dispatching and progressive control.

P.T.O

Section – II

Marks

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

a) Give two benefits of work-study.

b) How is standard Time arrived at?

c) State various levels of inventory (minimum four).

d) What is Jig? Give its types.

e) State the guiding principles of Kaizen.

f) Give methodologies of 6-sigma approach.

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

a) Explain string diagram with its features.

b) Define store. Give its functions.

c) Give advantages of Jigs and fixtures.

d) Explain 3-2-1 principle of location.

e) Describe the stages of work-study.

f) Relate inventory with cost of the product.

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

a) Describe various techniques of wok measurement.

b) Explain ABC analysis of inventory control.

c) Give the measures and impact of waste reduction.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
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ODD TERM END EXAM NOV./ DEC -2016
EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE302/MG203**
COURSE NAME :- **MATERIAL TESTING**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **29 / 11 / 2016**

Instruction:-
1) Answers must be written in the main answer book provided.(and supplements if required)
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.

Marks

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

a) Explain the concept of stress in material.
b) State the relation between different modulae of stress.
c) Explain the concept of proof stress.
d) What is Universal Testing Machine?
e) State the different methods of hardness testing.
f) What is Resilence and toughness?

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

a) State Hooke's law and explain modulus of elasticity.
b) What properties we can derive from stress-strain curve?
c) What is rebound hardness? How is it measured?
d) Compare the results of compression tests of steel and cast iron.
e) Describe Knoop indentor with its speciality.
f) Draw a tensile test specimen with dimensions.

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

a) Describe Rock Well Hardness Test with diagrams.
b) Compare and contrast Brinell, Vicker's, and RockWell hardness tests.
c) Explain the parameters affecting tensile test.

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

a) State the principle of Radiography.

b) What are the types of Impact tests?

c) Enlist the various types of NDT tests.

d) What is the principle of magnetic particle test?

e) State the principle of Magnaflux.

f) List the characteristics of fatigue fracture.

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

a) Explain dye penetration test in details.

b) Discuss the requirements for creep resistance materials.

c) Explain the factors affecting the fatigue life.

d) Describe transmition method for ultrasonic inspection.

e) What do you understand by the appearance of defects on radiography?

f) Describe the purposes and advantages of Eddy current method.

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

a) Explain Impact test procedure with diagram.

b) Describe creep test procedure with the diagram of machine.

c) Discuss the X-ray radiography in details with the help of diagram.

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE412/MG408/MT408**

COURSE NAME :- **ENV. PROT. IN METALLURGICAL INDUSTRIES**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **23 / 11 / 2016**

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.

Section – I Marks

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

a) Write types of ecosystem.

b) Write names of harmful gases evolved when pouring cast iron.

c) Write names of harmful gases evolved in foundries.

d) Write air pollution sources from hot rolling mills.

e) Define Green House Effect.

f) Write about acid rain formation.

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

a) Write about classification of pollution and pollutants.

b) Write general characteristics of harmful waste gases evolved in foundries.

c) Write about harmful substances evolved from foundries.

d) Write about waste gases evolved from pipe welding.

e) Write about process and non process gases.

f) Write about ozone depletion.

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

a) Write about air pollution and is control measures.

b) Write about noise pollution with its sources, effects and control

c) Write about air pollution in Rolling Mill.

[P.T.O.]

Section – II	Marks

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

a) Define Preliminary treatment.

b) Define Hazardous waste.

c) Write a short note on classification of solid waste.

d) Define thermal pollution.

e) Write down the Radiation exposure standard.

f) What is mean by Environmental Audit?

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

a) Explain Trickling filter.

b) Why secondary treatment is called as biological treatment?

c) Write down the disposal and treatment of hazardous waste.

d) Explain phyto extraction.

e) Write down the causes of thermal pollution.

f) What are the different types of environmental audit?

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

a) Draw the schematic diagrm of waste water treatment process.

b) Discuss Rotating Biological contractors.

c) Write a short note on soltd waste management.

d) Write about EIA.

e) Write down the sources of Radiation Pollution.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MTE402/MG302** COURSE NAME: **PHYSICAL METALLURGY-II**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **25/11/2016**

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) What is temper embrittlement?

b) State the heat treatment defects.

c) Distinguish annealing & normalising

d) What are the quenching mediums?

e) What is polymer quenching?

f) How martensite is formed from austenite?

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

a) What is tempering of steel? Why it is necessary?

b) Explain heat treatment defects i) quench crack 2) oxidation.

c) What are the advantages of isothermal annealing over conventional annealing?

d) Explain the heat treatment given to high carbon steels to improve machinability.

e) Explain the effects of alloying elements on the TTT diagram.

f) Explain the furnace atmospheres.

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

a) Define hardenability. How it is measured? What affects the hardenability of steels?

P.T.O

b) Distinguish between

i) Fine grain steel & coarse grain steel

ii) Annealing & normalising

c) What is retained austenite? Why it is not desirable? How it can be eliminated?

Section – II **Marks**

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

a) Why a white layer is formed during nitriding .

b) Write applications of flame hardening.

c) Write the heat treatment procedures adopted for S.G iron casting.

d) What is age hardening?

e) What are the conditions necessary for precipitation hardening to take place in an alloy?

f) How the environmental control in heat treatment shop is done?

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

a) What is plasma nitriding? State its advantages.

b) Compare cyaniding and carbo-nitriding case hardening process.

c) Explain the principle of induction hardening.

d) State the limitation of flame hardening.

e) Explain malleabalizing heat treatment with microstructural changes.

f) Compare and contrast malleable cast iron and S.G iron.

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

a) Explain precipitation hardening of Al-Cu alloys. Draw structural changes.

b) Explain the principle and process of electrolytic bath hardening. Write its industrial applications.

c) What are the various methods of surface hardening? Explain Pack carburising? Write its limitations.

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ODD TERM END EXAM NOV./ DEC -2016
EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE403/MG303/MT303**
COURSE NAME :- **FOUNDRY TECHNOLOGY-II**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **05 / 12 / 2016**

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.

Section – I

Marks

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

a) What is mean by 'Reynold No'? State its significance.

b) State the function of pouring cup or basin.

c) State term 'Gating Ratio'. State which type of gating ratio for 1:5:5.

d) Explain equation of continuity. What is its importance?

e) State role of 'Sprue base or well'.

f) Why is 'taper sprue' preferred?

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

a) Write various requirements of good gating system.

b) Distinguish between pressurised and unpressurised gating ratio.

c) State two important function of 'riser'.

d) Explain Caine's method for riser determination.

e) What is meant by 'blind riser'? When is it preferred?

f) Explain 'Modulus Method' of Riser Determination.

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

a) Explain heat treatment effect on castings.
i) Effect of annealline. ii) Effect of hardening.

b) Explain four objectives of fettling on castings.

c) List various cleaning operation of castings. State purpose of 'Grinding'.

d) Explain classification of cast iron. What is WCI? How is it produced?

e) Write proerrties of Grey cast iron.

f) Explain term 'Nodule' and 'Nodularity' with respet to SG iron microstructure.

P.T.O.

Section – II	Marks

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

a) What is Austempered Ductile Iron?

b) What is the ultrasonic treatment used for?

c) What is Drossing in Aluminium melting?

d) What are inhibitors?

e) Write the effect of hydrogen on the copper castings.

f) Why S.G. Iron is preferred over the Malteable C.I.?

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

a) Explain deoxidation used in Cu melting.

b) Explain in brief i) Properties of SG Iron ii) Moulding for steel castings.

c) Explain the sandwitch method used in SG Iron production.

d) Write the characteristics of steel castings.

e) Explain modification of Al-Si alloys.

f) What is the role of fluxing in Cu melting practice? Explain.

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

a) What precautions are necessary in Aluminium melting?

b) Explain the moulding practice used for steel castings.

c) Explain the Drossing occurred in Cu melting. Write the methods to counter drossing.

d) Write the chemical composition of SG Iron. Explain the importance of Mg-recovery in SG Iron.

e) Describe the furnaces used in melting of Al, Cu alloys.

f) Explain in brief:- i) Alloying practice for steel. ii) Grain refining in Al castings.

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ODD TERM END EXAM NOV./ DEC -2016
EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE401/MG301**
COURSE NAME :- **METAL WORKING PROCESS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **03 / 12 / 2016**

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.

Section – I — Marks

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

a) Write the mechanisms of plastic deformation in metals.

b) What is spread in Rolling process?

c) What is 'Longitudinal Scroches' defect in wire drawing?

d) Write the classification ofMetal Working Porcesses.

e) What are 'Bull block' used in wire drawing?

f) Write the causes of 'twisted blooms' observed in rolling process.

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

a) What is the purpose of coating wires? Explain Borax coating.

b) What is Roll bite condition? Show zone of deformation, contact arc and angle of bite with a neat sketch.

c) Explain cold working processes.

d) Explain various types of mandrels used in tube drawing.

e) Explain the geometrical conditions in rolling.

f) What are the effects of plastic deformation on structure, properties of metals?

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

a) Draw a neat sketch of planetary mill and explain its working.

b) Define wire drawing. Explain the design of wire drawing die with neat sketch.

c) What are the advantages of hot working?

d) Explain patenting treatment of wires.

e) Explain any four defects observed in rolling process.

f) Explain in brief i) Top pressure and bottom pressure in rolling. ii) Draw benches.

(P.T.O.)

Section – II

Marks

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

a) What is meant by Forging of metals?

b) List the type of steels that can be forged.

c) State the formula for determination of the duration of heating the steel for forging.

d) What are the advantages of electrical heating of steels for forging?

e) What are the limitations of vertical presses used for extrusion?

f) Give examples of parts manufactured by sheet metal working.

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

a) Describe various hand-forging operations, in brief.

b) Explain the effect of hammering on the grain structure and properties of metals.

c) With a neat labelled diagram explain the working of a pneumatic forging hammer.

d) Compare direct and indirect extrusion.

e) Explain the principles of different types of shears/blades used for cutting sheet metals.

f) State the differences between blanking and piercing operations of sheet metal.

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

a) State the causes and remedies of any two forging defects.

b) Explain manufacturing of tubes by extrusion process.

c) With a neat labelled diagram, explain impact extrusion.

d) Why the container needs to be heated during extrusion? Describe various methods of heating the container.?

e) A proper clearance between punch and die is necessary for blanking and piercing of sheet metal. Explain why.

f) Explain rubber pad bending operation with neat diagram. What are the advantages of this process?

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FIFTH PROGRAM: METALLURGY

COURSE CODE: MTE504/MG405 COURSE NAME: QUALITY MANAGEMENT

MAX. MARKS: 80 TIME: 3 HRS. DATE: 03/12/2016

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) Define quality control.
b) How inspection is different from quantity control?
c) Why quality audits are done?
d) Define quality assurance
e) Why increasing the quality of design leads to higher costs.
f) What are external failure costs?

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

a) Differentiate clearly between quality of design & quality of confirmation.
b) Describe the role of management and suppliers to ensure the quality of product.
c) i) Explain quality policies in foundry.
ii) Describe the formation & working of quality circles.

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

a) Explain internal failure cost and Appraisal cost.
b) Describe the prevention cost and its importance.
c) Explain the purpose and contents of quality audits.

Section – II **Marks**

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

a) Define TQM
b) Explain the jurisdiction of TQM
c) What ISO 14001 is about?
d) Give two objectives of ISO
e) What is SQC?
f) State the aim of quality circle.

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

a) State the benefits of ISO 14001 standard
b) Describe the effectiveness of TQM
c) Describe the functions of quality circles.
d) Give the focus areas of SQC
e) State the applications of quality curves.
f) State the reasons for adaption of TQM.

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

a) Describe the primary elements of TQM
b) Describe the principles of ISO9000 standard
c) What are variable control and Attribute control charts? State their advantages.

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EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE405/MG307/MT307**
COURSE NAME :- **FAILURE ANALYSIS & SELECTION OF MATERIALS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **02 / 12 / 2016**

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.

Section – I Marks

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

a) What are the different categories of stressors?
b) What should be the content of failure analysis report?
c) What are the causes of failure of in crankshaft in automobile engine?
d) Explain the characteristics of ductile failure.
e) What are the modes of fracture?
f) What are the two causes of intercrystalline brittle fracture?

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

a) Explain the relationship between stress concentration, crack length and crack tip radius.
b) What are the different types of failure?
c) Differentiate between ductile and brittle fracture.
d) What is the difference between fracture stress and tensile strength?
e) Explain in brief all factors that affect ductile brittle transition temperature.
f) Explain the mechanism of fatigue failure.

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

a) What do you understand by the term 'fracture toughness'? What is its importance in predicting the performance of a component?
b) Explain the steps in investigation of failures.
c) What are stress raisers and strength reducers?

P.T.O.

Section – II	Marks

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

a) What are stainless steels?

b) What is weldability?

c) What is weighted propirty index?

d) What are the HSLA steels? Write its applications.

e) How tool steels are different from plain carbon-steels?

f) Suggest suitable material for Gear. Justify your selection.

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

a) Explain chemical compossition, properties and applications of cold working dies.

b) What are heat resistant alloys? Write their chemical composition and application.

c) Write steps in material selection for existing design.

d) Explain cavitation type of wear.

e) Suggest suitable materials for following components. Justify your selection

i) Camshaft ii) Piston.

f) What are the advantages of use of computers in selection of materials? Explain.

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

a) Define Wear. Explain the classification of Wear. What is erosion?

b) Explain classification of tool steels. Explain chemical composition,properties and applications of high speed steel (HSS)

c) Explain :-

i) Weldability ii) Formability iii) Forgeability iv) factors affecting material prices.

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ODD TERM END EXAM NOV./ DEC -2016
EXAM SEAT NO. | | | | | | |

LEVEL :- FIFTH PROGRAM : METALLURGY
COURSE CODE :- MTE508/MG407/MT407
COURSE NAME :- ADVANCED PHYSICAL METALLURGY
MAX. MARKS : 80 TIME : 3 HRS. DATE :- 01 / 12 / 2016

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.

Section – I Marks

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

a) Enlist the important properties of X-ray.

b) Explain the effect of Nickle on the properties of steel.

c) Give the classification of steel on the basis of microstructure.

d) What do you understand by the term machinability index?

e) Define Wear.

f) 'X-rays are used to determine crystal structure'. State if the statement is true or false.

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

a) What are the advantages of alloy steel over plain carbon steel?

b) Explain the effect of alloying elements on Iron-Carbon diagram.

c) Explain how machinability of high carbon steels can be improved.

d) Explain the properties and composition of Hadfield's Manganese steel. Give its two uses.

e) What do you understand by the term 'austenite stabilizer'? Give two examples.

f) What are microalloyed steels? Write their properties and applications.

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

a) Explain Bragg's law for X-ray diffraction.

b) Explain the working principle of electron microscope.

c) Explain the effect of alloying elements on T-T-T diagram.

d) What are the limitations of plain carbon steels?

e) Explain impact wear, thermal wear and erosive wear.

f) What is machinability? Comment on the machinability of low carbon, medium carbon and high carbon steels.

(P.T.O.)

Section – II

Marks

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

a) Write chemical composition and properties of haste alloys.

b) State Fick's first law of diffusion.

c) How tool steels are different from plain carbon steels?

d) What is CVD?

e) Write the classification of stainless steels.

f) What is superalloy?

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

a) Explain solution treatment.

b) Explain growth of oxide layer by diffusion.

c) Explain PVD. Write its advantages and disadvantages.

d) What is carbide precipitation in stainless steels? Explain.

e) Enlist different properties important at elevated temperature. Explain with example.

f) 'Martensitic transformation is nuleotion and growth phenomenon. State true or false and justify.

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

a) What is meant by sensitization of stainless steel? How can this defect be removed?

b) Explain heat treatment of measuring instruments.

c) Explain various mechanisms of diffusion.

d) What are Austenitic stainless steels? Explain chemical composition and properties of A.S.S.

e) Explain order-disorder transformation.

f) Explain in brief i) Creep ii) Heat treatment of springs.

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