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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE303**
COURSE NAME :- **METALLURGICAL ANALYSIS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **25 / 04 / 2017**

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) What are different types of balances?
b) What are the solubility product indicates?
c) What is precipitate?
d) Give two examples of random errors.
e) Why quantitative analysis generally follows qualitative analysis?
f) Give the importance of sampling.

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

a) Describe the importance of sampling in metallurgical analysis.
b) Describe the process for obtaining sample of liquid metal.
c) State the procedure for preparation of 200ml solution of NaOH with 0.5M strength. (Na-23; 0-16; H-1).

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

a) What is masking? When is it preferred?
b) What is mean by completeness of precipitation?
c) Give the requirements of precipitated forms.
d) Explain 1M solution with example.
e) Describe the role of solubility product in precipitation.
f) Compare qualitative analysis with quantitative analysis.

P.T.O.

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

a) Define the calorimetry.

b) What is mean by Redox titration?

c) Define the volumetric analysis.

d) State the end point and equivalence point.

e) Define Titration, Titrant and Titre.

f) State four advantages of Instrumental analysis.

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

a) Why weak acid is not titrated with weak base? Explain with titration curve.

b) Explain the electrogravimetric analysis with diagram.

c) Describe the procedure for the determination of silicon from Ferrosilicon.

d) Give advantages and disadvantages of volumetric analysis.

e) Explain the procedure for the preparation of standard and dilute solution.

f) Compare and contrast volumetric and instrumental analysis.

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

a) Describe the combustion method with neat diagram and operations for carbon estimation from iron.

b) Define the neutralization curve. Explain the choice of indicator and describe the neutralization of weak acid with strong base with titration curve.

c) Explain i) Complex metric titration. ii) Precipitation titration.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE405/MG307**

COURSE NAME :- **FAILURE ANALYSIS & SELECTION OF MATERIAL**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **20/ 04 / 2017**

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 o 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 different types of failure?

b) What are the modes of fracture?

c) What is a quench crack?

d) Explain the mechanism of crack growth under cyclic loading.

e) What are the ways in which a notch increase the tendency of brittle fracture?

f) What is the effect of temperature on mechanical properties of metal?

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

a) What are the categories of stressors? Explain in brief.

b) What are the steps in conducting an investigation of failure?

c) Define fracture toughness? Explain its importance in predicting performance of a component.

d) Differentiate between ductile and brittle failure.

e) What is DBTT? Explain the factors, which affect the ductile brittle transition temperature.

f) What are the factors influencing brittle fracture?

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

a) Select a material for making jaws of a ball mill and gears in automobile engine.

b) What are the various causes of failure? Explain.

c) Explain i) Questions to be raised in examination of failure.

ii) Suitable material for surgical blades.

PTO

Section – II

Marks

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

a) What is formability?

b) Write the difference between low alloy and high alloy steels.

c) What is pitting corrosion?

d) Write two situations that involve a material selection problem.

e) Write the advantages of cold finishing steel.

f) What is erosion?

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

a) Write steps in material substitution for an existing design.

b) What is the difference between a high strength low alloy steel and carbon steel?

c) What is the difference between bending fatigue and torsion fatigue?

d) Select the material for the following automobile component. Justify your answer
i) Gear for two Wheeler. ii) Connecting rod for two Wheeler.

e) What are the important properties of stainless steels? Why do they become stainless?

f) Explain weighted property index.

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

a) Write the factors affecting material prices.

b) You want to case harden a 50mm dia. shaft for wear resistance. Select a proper steel and case hardening method for the shaft. Justify your answer.

c) What are the requirements of heat resistance alloys? Write classification of heat resistant alloys.

d) What is the difference between tool steels and alloy steel?

e) Select the material for any one of the following component. Justify your answer.
i) Railway wheel. ii) Front wheel axle for three wheeler.

f) What is weldability? Explain the factors that affect weldability

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE302/MG203**

COURSE NAME :- **MATERIAL TESTING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **19 / 04 / 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) State the principle of Rockwell hardness test.

b) Define the elastic limit in tensile testing.

c) Define the engineering strain.

d) Which indenter is used in Vicker's hardness test?

e) Define the Hook's Law.

f) What is the ductility?

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

a) Explain the engineering Stress and Strain.

b) Describe the principle and procedure for BHN test with diagram.

c) Discuss the tensile testing machine with diagram.

d) What are the major loads applicable in Rockwell hardness and explain the advantages?

e) Draw strain-stress curve for ductile material with yeild point and without yeild point

f) What is Hook's Law? Explain the meaning of Young's modulus, shear modulus and bulk modulus.

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

a) Explain Vicker's hardness test with principle, procedure along with advantages and disadvantages.

b) Describe poldi Hardness tester with diagram and advantages.

c) Describe shore scheleroscope hardness tester briefly with advantages.

PTO

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

a) For the same material with impact strength (Charpy / Izod) will be more, state the reason.

b) Which other data is derived from impact strengths?

c) What is endurance limit?

d) State the necessity of non-destructive tests.

e) Define creep.

f) Give two applications of visual examinations.

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

a) Describe the parameters affecting fatigue strength.

b) State the principle of eddy current test and the test proper.

c) Explain magna flux test. State its limitations.

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

a) Describe the advantages and disadvantages of penetrant test.

b) Draw and explain the standard creep curve.

c) Describe measures to improve fatigue strength.

d) Show the arrangement of specimen mounting in Charpy and Izod impact tests.

e) Explain the effect of grain size on creep strength.

f) Describe X-ray generation.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **SECOND** PROGRAM : **COMMON**

COURSE CODE :- **CCF/CCE202/X106**

COURSE NAME :- **COMMUNICATION SKILLS**

MAX. MARKS : **40** TIME : **2HRS.** DATE: - **20 / 04 / 2017**

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 (Answer the following questions in 3-5 sentences).** (08)

a) Write importance of oral communication for engineers.

b) Write four examples of oral communication.

c) State the advantages of written communication.

d) Define the term artefacts.

e) Write two advantages of LCD projector.

f) Explain panel interview.

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

a) Explain communication process with suitable diagram.

b) Explain mechanical and physical barriers.

c) Write strengths of media aided presentation.

d) Explain 'Media plays an important role in the communication processes'.

e) Write four advantages and disadvantages of oral communication.

f) Write short note on mock interview.

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

a) Write any four principles of effective communication.

b) Write an application for the post of Design Engineer in Tata Motors, Pune. Give your resume.

P.T.O

c) Prepare a pie-chart which shows the distribution of sales of the car industry among six car companies :

General Motors	: 37%
Maruti	: 22%
Ford	: 04%
Tata	: 12%
Hyundai	: 13%
Fiat	: 12%

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MTE309/MG206** COURSE NAME: **MECHANICAL ENGINEERING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **21/04/2017**

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.

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

a) Represent offset section with neat sketch.

b) Name any four parts of I.C engine with their material.

c) Give the names of strokes in 4 stroke petrol engine.

d) What are the different modes of heat transfer?

e) Write any two applications of heat transfer related to metallurgy field.

f) Draw free hand sketch of pump body.

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

a) Draw a neat sketch of engine body showing various parts.

b) Represent flywheel with proportionate diagram.

c) Describe the working principle of two stroke petrol engine.

d) Differentiate between SI and CI engine. (any four point)

e) Why insulation is necessary? Give the types of insulations.

f) Explain the concept of black body.

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

a) Draw a neat labeled diagram of flanged coupling showing various parts.(front view and top view)

b) Describe the construction and working principle of 4 – stroke diesel engine. Give its advantages and disadvantages.

c) The inner and outer surface of a furnace wall 30cm thick made of refractory bricks (K=1.35watts/m^0c) are at 1650^0C respectively. Find the reduction in heat loss through the wall to be obtained by adding 30cm. thickness of insulating bricks for which K is 0.3 watts/ m^0c, assuming the inside surface temperature of refractory bricks to remain fixed at 1650^0C. The temperature of outer surface of bricks may be taken as 27^0C

P.T.O.

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

a) Draw the conventional representation of pressure- temperature compensated flow control valve.

b) What do you mean by vapour pressure?

c) What are the types of belts used for transmission of power?

d) State the SI units of i) Surface Tension ii) Mass Density.

e) State the factors affecting power transmission by belts.

f) State the types of ropes used in rope drive.

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

a) How compressors are classified?

b) State the advantages and disadvantages of gear drive.

c) What are actuators? State the purpose & classify them.

d) Define viscosity. What are the types of it? And what is the effect of temperature on viscosity of liquids?

e) State any four advantages and disadvantages of V belt drive over flat belt drive.

f) Draw a neat sketch of Hydraulic power pack.

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

a) With neat sketch, explain vane type of compressor.

b) Explain with neat sketch filter and lubricator unit of FRL.

c) The right limb of a single U-tube manometer containing mercury is open to the atmosphere while left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The center of pipe is 12cm below the level of mercury in the right, limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.

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EVEN TERM END EXAM APRIL/MAY-2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE:**MTE305.** COURSE NAME: **EXTRACTION OF NON-FERROUS METALLURGY.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **21/04/2017.**

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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7) Use of Mobile is strictly prohibited.

Marks

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

a) What is matte?
b) Define the cryolite.
c) What is the blister copper?
d) State ores & deposits of Aluminum ore.
e) Define the ore dressing.
f) What are primary & secondary metals?

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

a) What are the advantages & disadvantages of hydrometallurgy?
b) Explain fire refining of copper.
c) Explain WORCRA process for continuous copper production.
d) Describe any two types of roasting process.
e) Explain the electrolytic refining of Aluminum.
f) Explain the applications of cryolite with respect to its properties.

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

a) Explain the pyrometallurgical extraction of copper with flow sheet.
b) Describe the method for extraction of metal a) Pyrometallugy b) Hydrometallurgy c) Electrometallurgy.
c) Explain the Hall-Heroult process with flow sheet of synthesis of Cryolite.

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

a) State two uses of lead (Pb).
b) State two applications of Uranium.
c) State two names of zinc ore.
d) State one property and use of zinc.
e) Enlist method used for production of Thorium.
f) Write purpose of ore dressing of lead.

PTO

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

a) Explain 'Parke's process'of lead refining.
b) Explain refining of lead bullion with flow sheet.
c) Describe ISP method of zinc refining.
d) Distinguish between Horizontal and vertical retort reduction in zinc.
e) Explain smelting of lead with blast furnace reaction.
f) Draw a flow sheet for concentrate monazik production

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

a) Explain physical & chemical method for beneficiation of complex ore of Nuclear fuel.
b) Explain the extraction of reactor grade Thorium nitrate.
c) Explain pyrometallurgical Extraction of Zn.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

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

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

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **21/04/2017**

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 the crystal structure of martensite? Show the positions of carbon atoms in unit cell of matensite.

b) What are the advantages of isothermal annealing over conventional annealing (any four)

c) Which quenching mediums are used for heat treatments of steels?

d) Draw a neat labeled diagram of muffle furnace.

e) Define hardenability.

f) What is the use of data of hardenability curve in industry?

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

a) Describe dependence of austenite grain size in the heat treatment.

b) Compare the annealing and normalizing of

i) Temperature range of heating

ii) Mechanical properties

iii) Microstructure

c) Draw typical heat treatment cycles for isothermal annealing of hypoeutectic and eutectoid steels. Also describe the processes.

d) Explain the mechanism of heat removal during quenching.

e) What are the polymer quenchants? Write the advantages of a polymer quenching?

f) What are the factors affecting hardenability.

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

a) Compare and contrast austenite to pearlite transformation and austenite to bainite transformation.

b) What are T-T-T diagram? Draw TTT diagram for eutectoid steel and hypoeutectoid steel. Explain it in brief? Write the uses of TTT diagram.

P.T.O

c) What is the purpose of tempering? What are the various stages of tempering? Explain why steel becomes soft on tempering?

Section – II

Marks

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

a) Define carburizing & state time required case depth & temperature in carburizing.

b) Which carbonicious material used in solid carburizing.

c) State true & false & justify your answer "surface hardening does require furnace"

d) Write two properties of Aluminum alloys.

e) Write two controls in heat treatment shop.

f) What is G.P. zone theory?

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

a) What are the defects produced after heat treatment?

b) Explain Tufftriding method.

c) Explain induction hardening method.

d) Write types of flame hardening & explain any one method.

e) Write heat treatment of malleable C.I

f) Explain properties of S.G iron.

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

a) Explain principle & process of carbonitriding.

b) Explain the process of liquid carburizing.

c) Explain electrolytic bath hardening method.

d) Write difference between surface hardening & through hardening.

e) Write heat treatment of grey C.I

f) Explain modification of Al-Si-Alloy.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIRST** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE101**
COURSE NAME :- **FURNACES, REFRACTORIES & PYROMETRY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **21 / 04 / 2017**

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.
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6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

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

a) Give the classification of fuels.

b) Write the uses of coal.

c) Define the calorific value of fuel. State units.

d) Why the viscosity of liquid fuel is an important property?

e) Write the uses of natural gas.

f) State the importance of silica refractory in metallurgical industries.

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

a) Explain the process of carbonization of coal..

b) State the advantage, disadvantage and application of liquid fuel.

c) Explain various types of flames.

d) State the gaseous fuel? Explain any one of them in details.

e) Explain direct arc and indirect arc furnace.

f) Compare acid, basic and neutral Refractories.

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

a) Distinguish between coke and coal.

b) With the help of neat sketch, explain the working of induction furnace.

c) Explain water gas and producer gas.

d) Distinguish between blast furnace gas and coke oven gas.

e) Write the principle and melting procedure for cupola furnace. Which are different types of cupola furnace?

f) Explain oil fired furnace (rotary furnace).

PTO

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

a) What is neutral refractory? Give examples.

b) What is Thomson effect?

c) Give two examples of base metal thermocouples.

d) Define porosity of refractories.

e) Write the applications tempil sticks.

f) Write properties of Zirconia.

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

a) Explain the principle and applications of radiation pyrometer.

b) Explain Seeback effect and write its applications.

c) Differentiate between acid refractories & basic refractories.

d) Explain insulating materials.

e) Discuss any two tests of refractories.

f) What is segar cone? How is it used to measure temperature?

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

a) Explain the working of disappearing type optical pyrometer.

b) Describe failure of refractories due to spalling.

c) Differentiate between silica and chromite refractories.

d) Explain i) Peltier effect ii) Corwool.

e) Define refractoriness. What are the requirements of refractories?

f) Explain i) Calibration of thermocouples. ii) Fireclay bricks.

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EVEN TERM END EXAM APRIL/MAY-2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST.** PROGRAM: **CE/ME/SM/MT.**

COURSE CODE:**CCF103/CCE103/X109/X103**

COURSE NAME: **CHEMISTRY OF ENGINEERING MATERIALS.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **24/04/2017**

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 if necessary.
7) Use of Mobile is strictly prohibited.

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

a) Write fundamental particles of atom with respect to charge & mass.

b) Define atom. Why the structure of atom is neutral?

c) Define Conductor & Electrolyte.

d) Distinguish between metallic conduction & Electrolytic condition.(any two points).

e) Write impurities in water.

f) Write any two reactions of hard water with soap.

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

a) Write the formation of NaCl molecule. Which is the type of bond?

b) With diagram explain electrolysis of $CuSO_4$ solution by using Pt electrodes.

c) Which is the method used for coating irregularly shaped articles & explain it with diagram?

d) Write classification of corrosion. Which film is called as protective type & why?

e) Write disadvantages of hard water for textile industry & dying industry.

f) Explain with diagram ion exchange method to remove total hardness of water.

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

a) State & explain Hund's rule of maximum multiplicity.

b) Calculate the time in seconds in which 0.3gms of copper is deposited from $CuSo_4$ solution when a current of 0.5 amp is passed. The chemical equivalent (eq.wt.)of Cu being 31.6.

c) Write factors affecting atmospheric corrosion.

d) Distinguish between hard water & soft water.(any four points)

e) With chemical reactions explain sterilization of water by using bleaching powder.

f) What are the disadvantages of scale formation in boilers?

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

a) Define the terms 1) Mineral 2) Ore.

b) Write any four application of monel metal alloy.

c) Give any four function of lubricant.

d) Write with example classification of composite materials.

e) State two constituents of paint and give one function of each.

f) Give the characteristics of good insulator.

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

a) Write chemical reactions involved in the zone of reduction of blast furnace.

b) Distinguish between calcination and roasting.

c) Define alloy. Give the classification of alloy. State the purposes of making alloy

d) Explain with diagram gravity separation method.

e) Define oil paint . Write characteristics of good oil paint.

f) What is lubrication ? Explain the Fluid film lubrication with diagram.

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

a) Define lubricant. Suggest the suitable lubricant for

   i) Gears

   ii) Cutting tools

   iii) Concrete mixture machine

b) Give four points of difference between paint and varnish.

c) Define polymerization. Give the types of polymerization. State the characteristics of thermosoftening plastic.

d) Write any four uses of rubber based on it's different properties.

e) Define adhesive. Write characteristics of good adhesives.

f) How is thermocole prepared? Write the uses and properties of thermocole.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE505 /MG210**

COURSE NAME :- **INDUSTRIAL ENGINEERING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **02 / 05 / 2017**

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 o 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) Suggest type of production system for manufacturing i) 2 wheeler ii) ship.

c) How government helps for industrialization in backward areas?

d) Enlist four factors affecting process planning.

e) What are the various activities carried out by production planning and control (PPC) department.

f) Enlist two advantages of Gantt chart.

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

a) Explain various techniques of improving productivity.

b) How break even point is calculated?

c) Enlist eight factors affecting site selection.

d) Explain any four principles of plant layout design.

e) What are AGV's? How they are useful to industry?

f) Evaluate the selection of material handling equipments for automated foundry.

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

a) i) How sequencing of operations is decided?
ii) What are the advantages and disadvantages of combined operations?

b) i) Define Machine capacity and plant capacity.
ii) How inspection stages are decided?

c) Explain the sequencing method for n job and 2 machines.

Section – II	Marks

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

a) What is method study? State its objective.

b) Write any four symbols used in process chart.

c) What do you mean by EOQ? Write formula of EOQ.

d) What are the different components of Jig & fixture?

e) What is mean by push manufacturing system and full manufacturing system

f) Give the meaning of 5'S'

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

a) Explain the outline process chart to change the simcard of mobile phone

b) Define time study? Explain various equipments used in time study.

c) What are the different types of inventory model?

d) Explain with neat sketch, the relationship between cost and inventory.

e) What is 3-2-1 principle of location? Explain with suitable sketch

f) What is flexible manufacturing system? Discuss its advantages and disadvantages

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

a) What is mean by Allowances? Explain different types of allowances.

b) Explain concept of merit resting. State objectives of merit rating.

c) Explain the term MRP.

d) Find EOQ from the following Data:

i) Average annual demand = 60Units ii) Procurement cost= Rs15 per order.

iii) Cost per piece = Rs.100. iv) Cost of carrying inventory = 10%.

e) Describe design principles of Jig and fixture.

f) What is brain storming? Write procedure of brain storming.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCF110/CCE110/X111/R112** COURSE NAME: **APPLIED MECHANICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **02/05/2017**

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.

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

a) Define concurrent force system with any one of field example.

b) State polygon law of forces.

c) Explain funicular polygon with its use.

d) State any two laws of friction.

e) Explain the relationship between angle of friction & angle of Repose.

f) Draw free body diagram of body resting on rough inclined surface.

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

a) Resolve the 200N force along 30^0 & 20^0 on either side with neat sketch.

b) Find resultant in magnitude & direction of forces 1kN, 2kN, 3kN, 4kN, 5kN and 6kN acting from center of hexagon towards its angular points respectively. (solve by analytical method)

c) Solve Q.No.2 (b) by graphical method.

d) An electric bulb of 5N weight is hanging from ceiling. Its wire is pulled by a force acting horizontally such that the wire makes an angle of 60^0 with ceiling. Find the magnitude of pulled force & tension in the wire.

e) Find the support reaction of beam ABCD supported at 'A' & 'C' & portion CD is overhang. The given span is AB=BC=2m & CD=1.5m. The UDL of 20kN/m is acting on 'B' to 'D' with downward point load of 50kN acting at point D free end.

f) The body of weight 100N will begin to slide when horizontal plane is raised gradually upto 22^0. What is horizontals force required to drag the same body.

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

a) The forces 50N, 30N, 20N & 15N are acting on four sides of 10cm square box respectively on clockwise direction. Find resultant from force & locate from 50N side.

b) Three forces are acting along three side of an equilateral triangle of side 2m with forces 15N, 20N & 10N respectively. Find resultant from force of side 10N.

c) A solid sphere of radius 10cm weighing 1.2KN is hung with steel cable 50cm from vertical smooth wall to its center. Find the contact force between wall & solid sphere & tension in cable.

P.T.O

d) Beam AB of span 6m is hinged at A & roller support at B carrying vertically downward point load of 12kN at 2m from support A & inclined point load of 10kN inclined at 30^0 anticlockwise from horizontal at 4m from support A, Also udl of 5kN/m is acting over entire span. Calculate support reaction by analytical method.

e) Solve Q.No.3 (d) by graphical method.

f) A ladder of 3.5m with weight 150N is rested on smooth vertical wall & rough horizontal surface with 18^0 inclination to horizontal. What is force (pull) required at horizontal contact surface to keep ladder in equilibrium when man weighing 750N stands on its mid length. Take coefficient of friction between rough horizontal surface is 0.25.

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

a) Define Rectilinear motion.

b) Differentiate displacement & distance.

c) Define angular velocity.

d) Define energy.

e) Define work done by torque.

f) State law of machine with meaning of each notation.

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

a) A composite section as shown in figure in which a equilateral triangle is rested on a square. Determine centroidal position of the section from reference axes X& Y

b) A circular disc of 500mm diameter is cut off from a sheet of radius 500mm find the centroid of the remainder portion from reference axes X&Y as shown in figure.

c) A car staring from rest & increases speed from 0 to 10m/s with constant acceleration 0.5 m/sec^2 runs at this speed for a time of 30 seconds & finally comes to rest, with deceleration of $0.3m/sec^2$. Find the total distance travelled by car.

d) A wheel moves from 200rpm to 150 rpm in 10 seconds find the retardation & time required to come to stop.

e) A bullet weighing 1N is fired with velocity 400m/sec. into a wooden block weighing 100N. If the bullet remains embedded in the block, calculate the velocity of the block after impact.

f) In a simple lifting machine 100N is lifted by an effort of 8N at an efficiency 62.5%. Find the effort lost in friction & the load lost in friction.

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

a) Determine center of gravity of a solid composite body as shown in figure from the base of body.

b) A stone is dropped into well. Its sound is heard after 3 seconds. The velocity of sound is 320 m/sec. find the depth of well.

c) A wheel starts from the rest & accelerates at 15 red/sec^2 until it reaches a speed of 300 rpm. With this speed it rotates for 3 minutes & then retards uniformly for 150 seconds & stops. Find total number of revaluations made.

d) In a simple lifting machine the effort required to lift a certain load is 150N. When efficiency is 65%. Find ideal effort of machine.

e) A simple lifting machine lifts a load of 400N & 600N by efforts of 60N & 80N respectively. Find law of machine & efficiency at a load of 800N if velocity ratio of machine is 22.

f) 300 cubic meters of water is to be raised to a tank of height 10 meters in 10 minutes. Calculate the power of the pump required in kilowatt.

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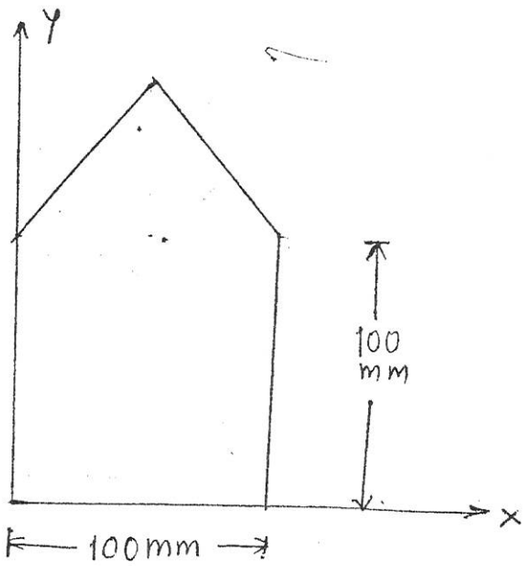
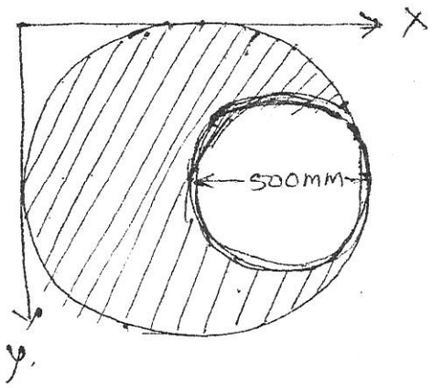
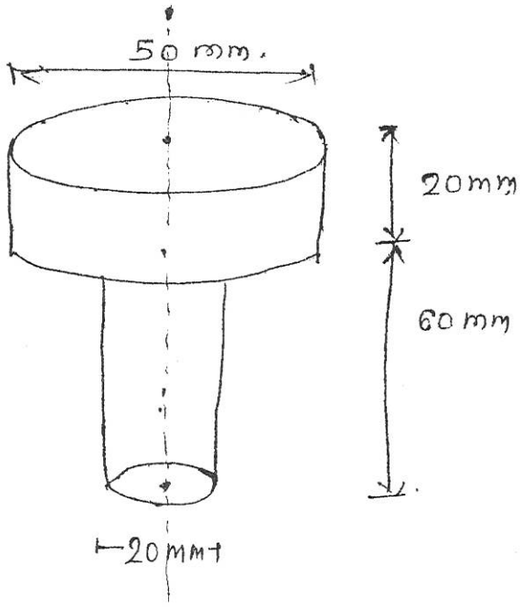
Q.5)
a)



Q.5)
b)



Q.6) a)



GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE:**MTE403** COURSE NAME: **FOUNDRY TECHNOLOGY II**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **03/05/2017**

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 if necessary.
7) Use of Mobile is strictly prohibited.

Section – I **Marks**

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

a) State equation of continuity with significance.

b) Write formulae of Bernoulli's theorem.

c) What is mean by pressurized gating ratio? When it is preferred?

d) Write advantages of gating system.

e) State role of 'Ingate'. How is the Nos. of ingate decided?

f) Define term 'Gating ratio'.

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

a) Write down steps in designing of Gating system. How pouring time calculated explains with suitable example.

b) Explain inscribed circle method for riser determination.

c) State types of riser. Why riser is necessary?

d) What is mean by' directional solidification'. How it is achieve using Riser.

e) State role of chills and pads.

f) What is mean by fettling? State list of fettling operation.

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

a) Draw a std. Gating system. Explain function of each part.

b) Explain Sand blasting process use in fettling.

c) State objectives of heat treatment on castings.

d) Write properties and application of Grey CI. For production of SG iron.

e) Explain 'Sandwich Method' of Mg treatment.

f) Why S.G. iron is ductile?

P.T.O.

Section – II

Marks

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

a) Write composition & applications of S.G. iron.

b) Write furnaces used in production of steel castings.

c) 'Aluminium require very clean melting practice' why?

d) Magnesium casting requires sprue with rectangular crosssection.why?

e) What protective agents are used to protect Cu-melt from drossing.

f) Explain in brief

1) Die casting for Zinc alloy.

2) Grain Refining in Al .

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

a) Explain role of inhibitors added in moulding sand used for Mg casting.

b) Enlist various alloying elements added in steel castings. What is the effect of Ni & Cr on steel casting?

c) Explain various sources of hydrogen pick up in molten Aluminium. Discuss degassing practice used for Aluminium alloys.

d) Explain sandwich method for production S.G. iron.

e) What is drossing observed in Cu-melt? How to avoid drossing?

f) Explain 1) Moulding for Cu-alloy casting.

2) Risering in Mg casting.

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

a) Explain fluxing & flushing of Aluminium melt.

b) Explain recovery of Magnesium in S.G. iron.

c) Discuss the problem of hydrogen pick up in Cu-alloys of its removal technique.

d) Describe gating employed in Magnesium castings.

e) Explain modification of Al-Si alloys.

f) Explain 1) Vacuum melting of cast steel alloys.

2) Zn casting alloys.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCF105/CCE105/X104/R107/107** COURSE NAME: **BASIC MATHEMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **09/05/2017**

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.

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

a) Resolve into partial fraction $\frac{1}{x^2 - x}$

b) If $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & -4 & 0 \end{bmatrix}$ & $B = \begin{bmatrix} 0 & 2 \\ -3 & 1 \\ 4 & -1 \end{bmatrix}$ is the matrix AB is non singular.

c) Evaluate i) ${}^{7}P_{3}$ ii) ${}^{4}C_{3}$

d) Solve the equations by matrix method

$3x + y = 1$

$5x + 2y = 3$

e) Expand the following binomial upto 4th term of the expansion $(1+2x)^{1/2}$

f) Expand $(x+y)^5$ by using binomial theorem.

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

a) Find k if $\begin{vmatrix} 2-k & 7 \\ 3 & -4 & 13 \\ 8 & -11 & 33 \end{vmatrix} = 0$

b) Resolve into partial fraction $\frac{x^3 + x}{x - 9}$

c) If $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$ show that A^2-8A is a scaler matrix.

d) Resolve into partial fraction $\frac{x^2 + x + 1}{(x-1)^3}$

e) If $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 5 \\ 3 & -2 \end{bmatrix}$, $c = \begin{bmatrix} 3 & -1 \\ 0 & 6 \end{bmatrix}$ Find 3A+4B-2C

f) Find x and y if $\left\{4\begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 3 \end{bmatrix} - 2\begin{bmatrix} 1 & 3 & 1 \\ 2 & -3 & 4 \end{bmatrix}\right\}\begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

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

a) Solve the equations by Cramer's rule

$x + y + z = 3$

$x - y + z = 1$

$x + y - 2z = 0$

P.T.O

b) Resolve into partial fraction $\frac{2x+1}{x^2(x+1)}$

c) If $A=\begin{bmatrix}1 & -3\\ 2 & -1\end{bmatrix}$ & $B=\begin{bmatrix}1 & 0 & 1\\ 2 & -1 & 3\end{bmatrix}$ *verify that* $(AB)^T = B^T A^T$

d) Resolve into partial fraction $\frac{2x+3}{x^2-2x-3}$

e) Show that $\left(\sqrt{3}+1\right)^5 - \left(\sqrt{3}-1\right)^5 = 152$

f) Solve the equation using matrix method

$x+y+x=2$

$y+z=1$

$x+z=3$

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

a) Prove that $\cos ec^2\theta - \cos^2\theta.\cos ec^2\theta = 1$

b) Without using calculator find $\sin 15^0$

c) If $\sin A = \frac{1}{2}$, *find* $\sin 3A$

d) Prove that $\cos 2\theta = 1-2\sin^2\theta$

e) Prove that $\sin\left(\theta+\frac{\pi}{6}\right) - \sin\left(\theta-\frac{\pi}{6}\right) = \cos\theta$

f) Find the principal value of $\cos^{-1}\left(\frac{-1}{2}\right) - \sin^{-1}\left(\frac{1}{2}\right)$

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

a) Prove that $\frac{\cos ecA}{\cos ecA-1} + \frac{\cos ecA}{\cos ecA+1} = 2\sec^2 A$

b) Prove that $\sin(A+B) = \sin A\cos B + \cos A\sin B$

c) Simplify $\frac{\cos^2(180^0-\theta)}{\sin(-\theta)} + \frac{\cos^2(270^0+\theta)}{\sin(180^0+\theta)}$

d) Prove that $\frac{\cos 3\theta}{\cos\theta} + \frac{\sin 3\theta}{\sin\theta} = 4\cos 2\theta$

e) Prove that $\frac{\sin 4A+\sin 5A+\sin 6A}{\cos 4A+\cos 5A+\cos 6A} = \tan 5A$

f) Prove that $\cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{33}{65}\right)$

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

a) If A & B are obtuse angles such that $\sin A = \frac{5}{13}$ & $\cos B = \frac{-4}{5}$. Find tan(A+B)

b) prove that $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

c) Prove that $\frac{1-\tan 2\theta.\tan\theta}{1+\tan 2\theta.\tan\theta} = \frac{\cos 3\theta}{\cos\theta}$

d) Prove that $\frac{\sin 8x-\sin 5x}{\cos 7x+\cos 6x} = \sin x + \cos x.\tan\frac{x}{2}$

e) Prove that $\tan^{-1}(x)+\tan^{-1}(y) = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$ *if* $xy<1$

f) Prove that $\tan^{-1}(1)+\tan^{-1}(2)+\tan^{-1}(3) = \pi$

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCF107/X105/R109/CCE107**

COURSE NAME: **ENGINEERING DRAWING -I**

MAX. MARKS: **80** TIME: **4 HRS.** DATE: **04/05/2017**

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.

Q.1 Attempt any **TWO** **Marks (08)**

a) On a plan of a field, a line of 1m long is represented on a drawing by a line of 5cm. construct a diagonal scale to read upto 2m and mark the length of 1m, 6 decimetres & 4cm on it.

b) Illustrate & write down application of following lines
   i) Ruled line with zigzag.
   ii) Short dashed medium.

c) Construct a scale of 1cm=0.4m to show metres & decimetres and large enough to measure upto 5m. Show a distance of 4m & 6 decimetres on it.

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

a) Construct an ellipse when the distance of focus from directrix is equal to 60mm & eccentricity=2/3.

b) The length of a top view of a straight line AB parallel to V.P & inclined at 40^0 to HP is 60mm. Its end A is 10mm above H.P is and 25mm infront of V.P. Draw front & Top views & determine the true length of the line AB.

c) Draw the projections F.V & T.V of a 75mm long straight line, inclined at 60^0 to V.P and its one end 15mm in front of it, parallel to and 25mm above H.P.

d) The top view of a 75mm long line measures 55mm. The line is in V.P, its one end being 25mm above the H.P. Draw its projections (F.V. and T.V)

e) End A & B of a line AB is 15mm & 55mm respectively infront of the V.P Elevation length of line is 60mm. it is parallel to XY line & 15mm above it. Draw Two views of the line & find its true length & inclination with V.P

f) The distance between the projectors through the ends of a line 75mm long is 60mm. Its end M is 15mm above HP & 20mm infront of V.P. Draw its two views when it is parallel to V.P. Determine its inclination with H.P.

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

a) Draw an Archemedian spiral of one convolution, the maximum & minimum radii being 80mm & 20mm respectively.

b) Draw a Helix on a cylinder of 50mm diameter of two turns, given pitch equal to 40mm.

c) A disc of diameter 50mm rolls without slip on a plane inclined at an angle of 15^0 to the horizontal. Trace & name the locus of point P on the circumference of the disc.

d) Draw in involute of a hexagon of side 20mm for one complete turn.

P.T.O

e) Draw a hyperbola with asymptotes OB=140 & OA=130 intersecting at an angle of 70^0 and passing trough point P on the curve 36mm from OB & 20mm from OA.

f) A stone is thrown upwards from a building 6m high & in its highest point of flight, it just crosses palm tree 12m high. Trace the path of the projectile, if the distance between the building and the palm tree be 3m. Take suitable scale.

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

a) A circular plate 50mm diameter has its center 30mm above HP & 35mm infront of VP. Draw the three views of the plate when the surface is perpendicular to VP & inclined at 45^0 to HP.

b) A rhombus having diagonals 60mm & 30mm respectively is resting on a corner in VP. The longer diagonal is parallel to HP & inclined to VP such that front view appears as a square. Determine the angle made by the rhombus with VP.

c) A pentagonal plane of side 30mm is resting on HP on one of its side with the corner opposite to that side, 25mm above HP side on HP is perpendicular to VP. Draw three views of the pentagonal plane & find its inclination with HP.

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

a) A cone of 50mm diameter & axis 70mm long is resting on HP on a point of its circumference of base such that its axis is parallel to VP & apex is 50mm above HP. Draw its projections.

b) A pentagonal prism base 20mm side & axis 55mm long, is standing on a corner of its base on HP with its axis inclined at 45^0 to HP & parallel to VP. Draw its projections.

c) A hexagonal pyramid base 25mm sides & axis 60mm long has a corner of base in the HP. Its axis makes an angle of 30^0 with HP & parallel to VP. Draw its projections.

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

a) A hexagonal pyramid base 30mm side & axis 70mm long has its base on HP with an edge of base parallel to VP. A section plane perpendicular to VP & inclined at 45^0 to HP cuts the axis of pyramid 30mm from the apex.
Draw-
   i) Front view (02 marks)
   ii) Sectional top view (03 marks)
   iii) True shape of section. (03 marks)

b) A cylinder of 50mm diameter & axis 70mm long has its axis perpendicular to HP. It is cut by a section plane perpendicular to VP & inclined at 45^0 to HP & intersecting the axis 40mm above the base.
Draw-
   i) Front view (02 marks)
   ii) Sectional top view (03 marks)
   iii) True shape of section (03 marks)

c) A square prism base 40mm side & axis 80mm long, stands vertically on HP with the edges of the base equally inclined to VP. A section plane perpendicular to VP & inclined at 60^0 to HP cuts the axis of prism 15mm from its top end.
Draw-
   i) Front view (02 marks)
   ii) Sectional Top view (03 marks)
   iii) True shape of section. (03 marks)

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE508/MG407**

COURSE NAME :- **ADVANCED PHYSICAL METALLURGY**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **04 / 05 / 2017**

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-rays.

b) Explain the classification of steels on the basis of application.

c) State Bragg's Law for X-ray diffraction.

d) Enlist the limitations of plain Carbon steels.

e) Define Machinability Index.

f) What is the effect of Ni on the properties of steel?

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

a) What do you understand by the terms austenite stabilizers and ferrite stabilizers. Give two examples of both types.

b) Explain the factors affecting Machinability index.

c) Explain powder method and write its application.

d) Differentiate between soft magnet and hard magnet.

e) What are micro-alloyed steel? Explain.

f) Explain i) Magnetic intensity ii) Advantages of electron microscope.

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

a) Explain the working principle of Electron microscope.

b) What is the effect of alloying elements on the shape of T-T-T curve?

c) Give the composition and properties of Hadfield's Mn Steel.

d) Explain Zaure method based on diffraction.

e) Write chemical composition, properties and application of Alnico & Fermico alloys.

f) Explain abrasive wear and Impact wear.

P.T.O.

	Section – II	Marks
Q.4	Attempt any **FOUR**	(08)

a) Define "Corrosion Resistance".

b) Write two properties of stainless steel.

c) Write two application of tool steel.

d) Define "Heat treatment".

e) What is carburizing.

f) Write one example of Fick's first law.

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

a) Explain role of Cromium in stainless steel.

b) Explain Carbide precipitation in stainless steel.

c) Write a note on super alloy steel.

d) Write Heat treatment of springs.

e) Explain classification of tool steel.

f) Explain Mechanism of diffusion.

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

a) Write short note on Martensitic Stainless steel.

b) Explain Austenitic stainless steel with properties, application.

c) Write note on CUD.

d) Write properties of tool steel.

e) Write precipitation hardening process.

f) Write short note on i) Nucleation ii) Grain growth.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY-2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST.** PROGRAM: **CE/EE/SM/MT.**

COURSE CODE:**CCF108/CCE108/X107/R110** COURSE NAME: **ENGINEERING DRAWING-II**

MAX. MARKS: **80** TIME: **4 HRS.** DATE: **28/04/2017**

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 if necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1 Draw neat proportionate free hand sketches of any **FOUR** of the following. **(08)**

a) Sellers thread.
b) Square nut.
c) Cup-headed bolt.
d) Slotted nut.
e) Eye foundation bolt.
f) Single riveted single strap butt joint.

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

a) Fig.no.01 shows pictorial view of an object.
Draw following views by using first angle method of projection.
i) Front view in the direction of X. (05marks)
ii) Top view. (05marks)
iii) Left hand side view. (05marks)
Give all dimensions. (01marks).

b) Fig.no.02. Shows pictorial view of bracket. Draw following views by using first angle method of projection.
i) Front view in the direction of X. (05marks)
ii) Top view. (05marks)
iii) Left hand side view. (05marks)
Give all dimensions. (01marks)

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

a) Fig.no.03 Shows pictorial view of an object. Draw following views by using first angle method of projection.
   i) Sectional front view, in the direction of X, section along AA. (06marks)
   ii) Top view. (05marks)
   iii) Left hand side view. (05marks)

b) Fig.no.04 Shows pictorial view of an object. Draw following views by using first angle method of projection.
   i) front view, in the direction of X. (05marks)
   ii) Top view. (05marks)
   iii) Sectional left hand side view, section along BB. (06marks)

P T O (1)

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

a) Fig. no.01 shows the front view and L.H.S.V. of an object. Draw the following views of the objects
   i) Front view. (02marks)
   ii) L.H.S.V. (02marks)
   iii) Top view. (missing view) (04marks)

b) Fig. no.02 show the front view and top view of the object. Draw the following views.
   i) Sectional front view A-A. (04marks)
   ii) Top view. (02marks)
   iii) R.H.S.V.(02marks)

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

a) Fig.no.03 shows the F.V. and T.V. of an object draw Isometric view taking '0' as origin.(16marks)

b) i) Fig.no.04 shows the F.V. and T.V. of an object draw Isometric projection taking '0' as origin.(14marks)
   ii) Construct the Isometric scale for the length 100mm.(2mark)

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

a) Draw the development of lateral surface of a pentagonal prism with edge of base 40mm and height 90mm, kept on the H.P. on its base with on edge of base parallel to V.P., When its cut by on AIP inclined at 30^0 to H.P. and bisecting the axis of the prism.

b) A cylinder having base diameter 50mm and axis length 70mm has its base in H.P. A square hole of side 25mm is drilled centrally having its sides equally inclined with H.P. and its axis being perpendicular to V.P. and bisecting the axis of the cylinder. Draw the DLS of the cylinder with the hole.

c) A square pyramid 50mm edge of base axis 60mm length is resting on its base in the H.P.with edge of base equally inclined to V.P. A square hole with side 25mm is cut through the square pyramid such that its axis intersect the axis of the pyramid ,22mm above the base. The axis of hole is perpendicular to V.P. All the faces of square hole are equally inclined with H.P. Draw the DLS of the pyramid.

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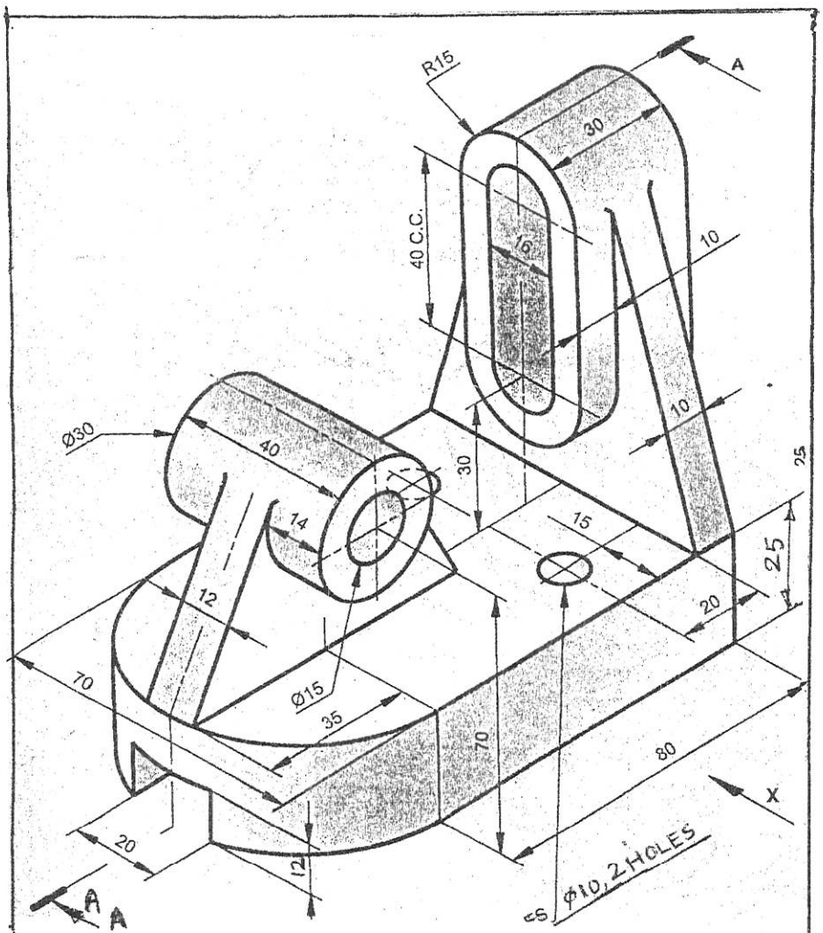
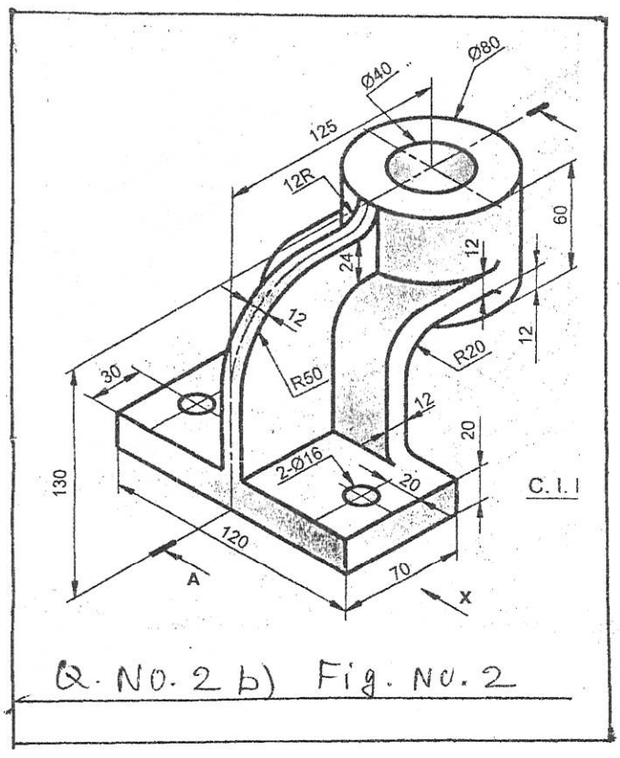
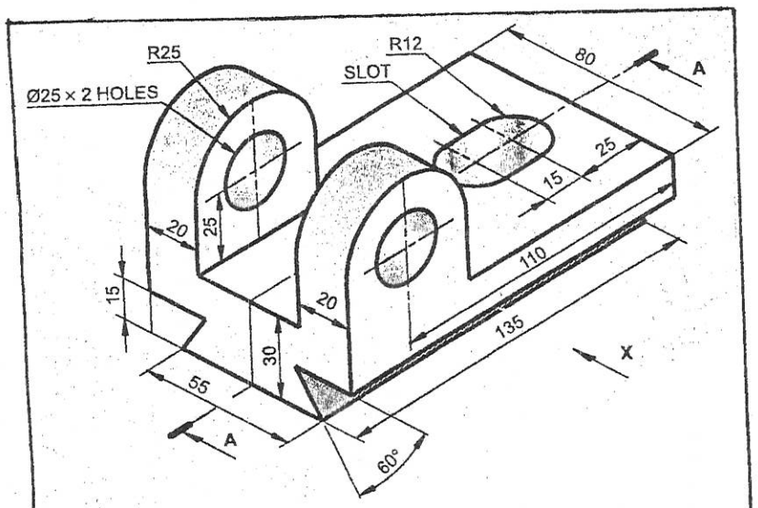


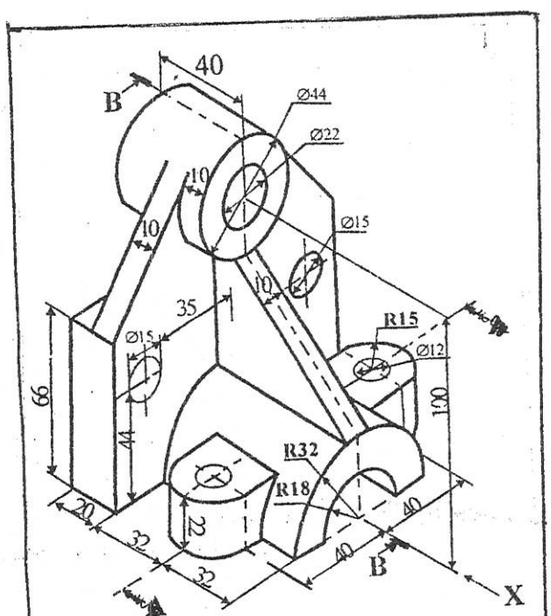
Q. NO. 2 a) Fig. NO. 1



Q. NO. 2 b) Fig. NO. 2

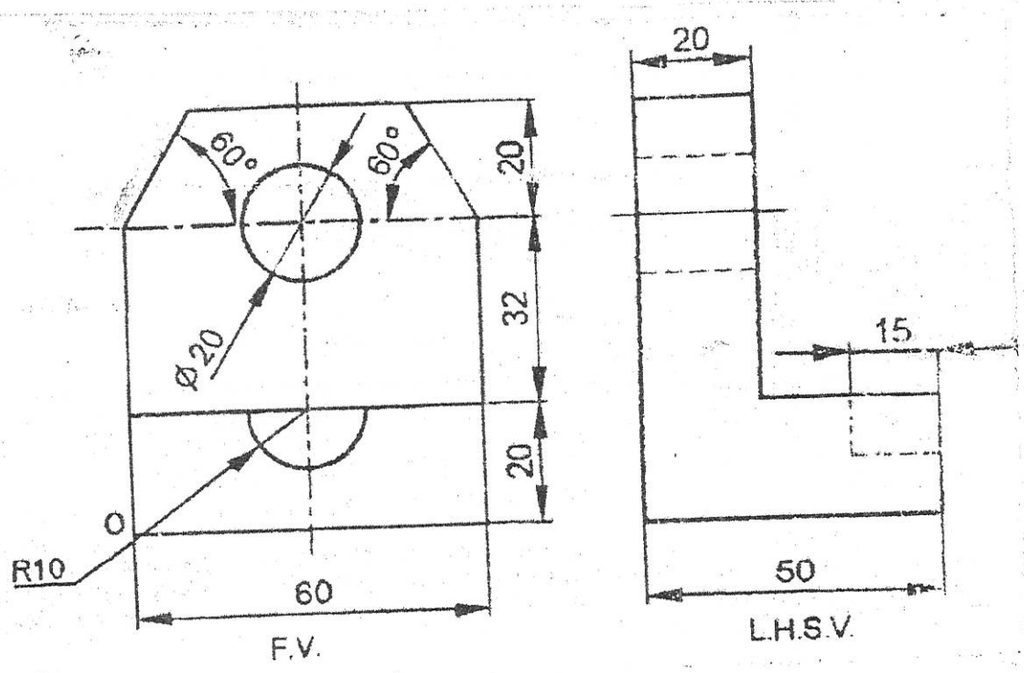


Q. NO. 3 a) Fig. NO. 3



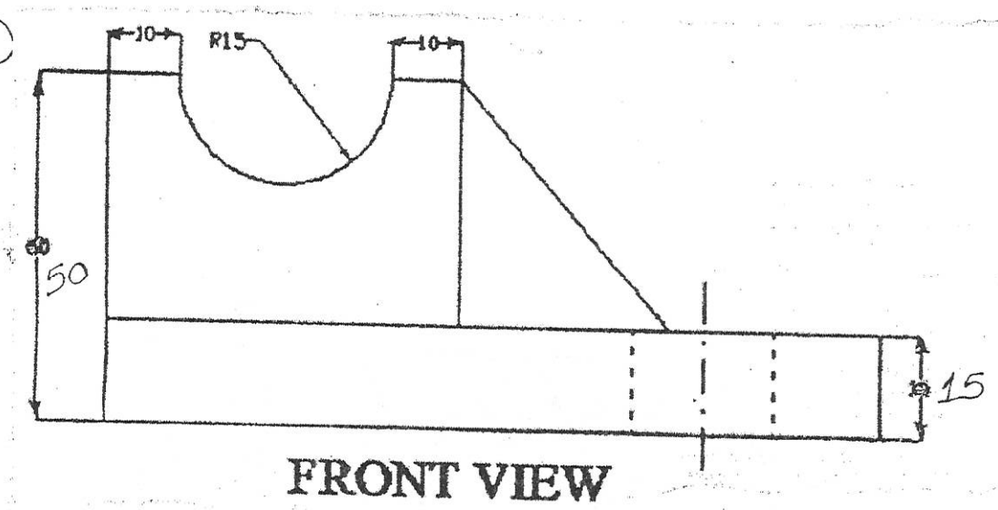
Q. NO. 3 b) Fig. NO. 4

Q. (4) (a)

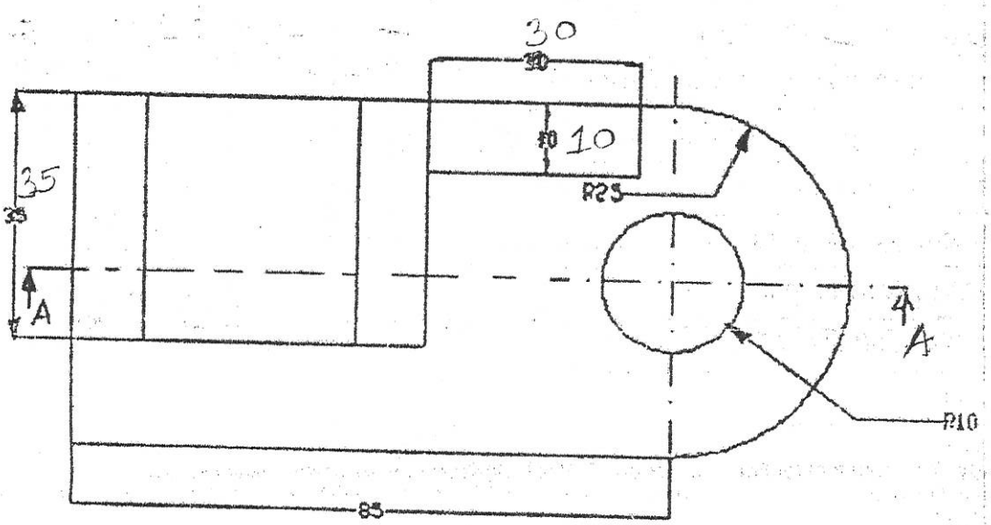


Q. 4 (a) Fig No -1

Q④(b)



FRONT VIEW



TOP VIEW

Q.4(b) Fig. No-2

Q5(a)

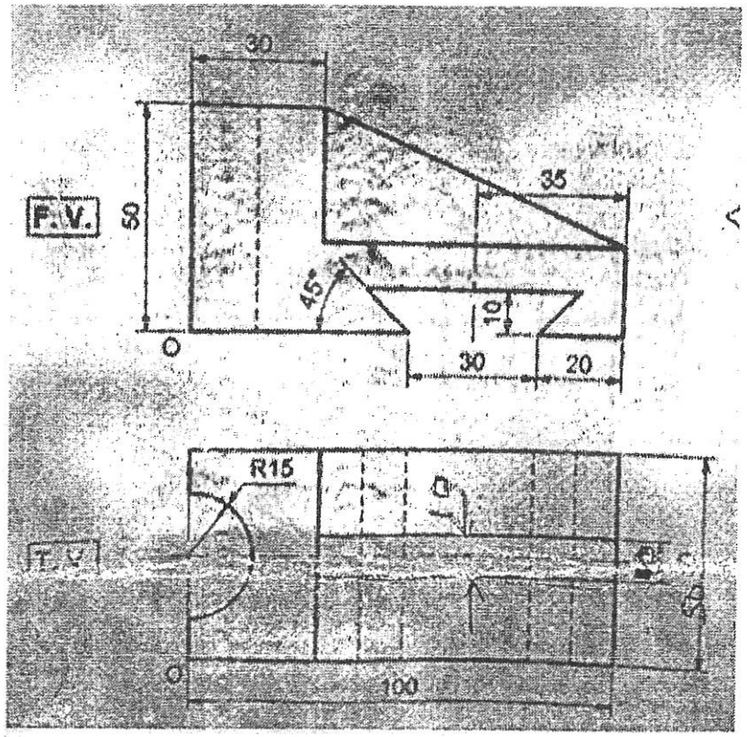


Fig. No. 3
Q. 5 @

Q5(b)

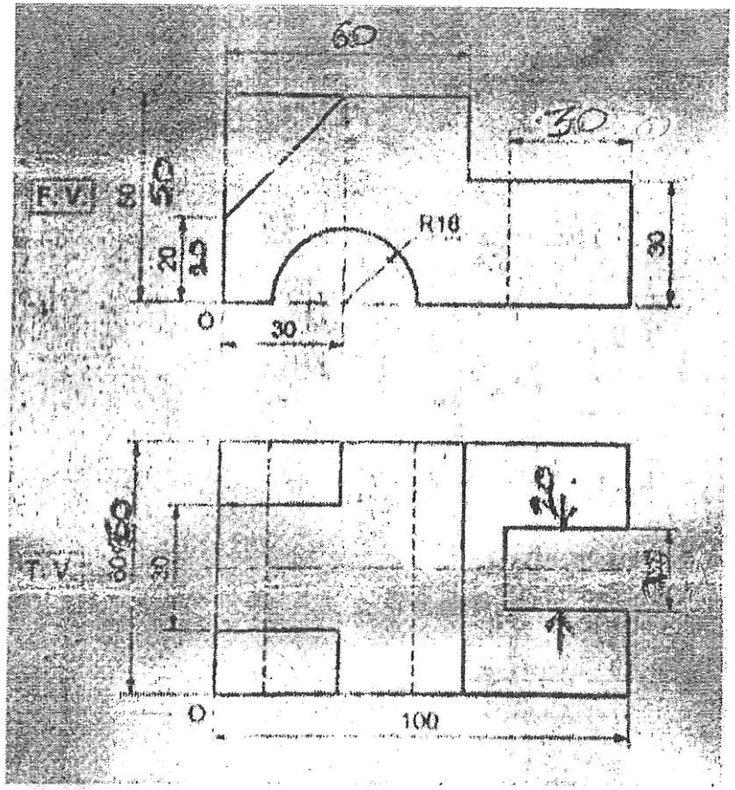


Fig NO. 4
Q. 5(b)

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE504/MG405**

COURSE NAME :- **QUALITY MANAGEMENT**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **28 / 04 / 2017**

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 o 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 cost of poor quality?

b) Compare quality control and quality assurance.

c) Define quality in two ways.

d) Give two aspects of quality control need to be addressed.

e) State the purpose of quality audit.

f) What is mean by quality economics?

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

a) Give and explain the elements of cost of quality.

b) Describe the objectives of quality circles.

c) Explain quality of performance.

d) What are the elements of quality maintenance?

e) Describe the conditions for success of quality circles.

f) Explain the elements of internal failure costs.

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

a) Explain at large the cost of quality and the value of quality.

b) Describe the elements of Internal and External audits.

c) Give the advantages and disadvantages of quality control.

P.T.O.

Section – II	Marks

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

a) Explain the evaluation of TQM.

b) What is the concept of ISO 9000?

c) Enlist advantages of ISO 9000.

d) What are the requirements of ISO 14001?

e) Why SQC is required?

f) Draw normal distribution curve. Give the meaning of it.

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

a) Describe the concept of benchmarking. Enlist levels of benchmarking and explain. Give benefits of it.

b) Describe the concept of KAIZEN and six sigma with example related to foundry.

c) Explain the QS 9000 Quality management system.

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

a) Describe the structure of ISO 9001-2000 series standards.

b) Enlist various control charts used in SQC. Describe X & R charts.

c) What is AQL and AOQL? Explain their significance & importance.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE308/MG209**
COURSE NAME :- **PHYSICAL METALLURGY-I**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **29 / 04 / 2017**

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 co-ordination number.

b) What are dendrites?

c) Enlist two uses of equilibrium diagrams.

d) Give two practical advantages of eutectic reaction.

e) Define peritectic reaction of iron and carbon in equilibrium diagram.

f) Why etching is done?

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

a) How miller indices is calculated for planes and directions?

b) Explain eutectoid reaction with equilibrium diagram.

c) Describe the lever rule with its applications.

d) Define allotropy and explain the allotropic transformation of pure iron

e) Describe the complete steps in specimen preparation for microscopic examination.

f) How mounting of specimen is done?

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

a) Draw cooling curve for pure metal and alloy. And explain solid solution formation.

b) What is intermetallic compound? How it affects the properties of alloys?

c) With the help of iron-iron carbide diagram explain all the critical points of transformation.

P.T.O.

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

a) What is manganese Bronze?

b) Which treatment is given to Duralumin?

c) Which Babbitts are economic for normal use? Lead based or Tin based?

d) What are main parts of metallurgical microscope?

e) Why microstructure of bearing alloys need two different types of phases?

f) Which is commonly used etching reagent for Mild steel.

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

a) Draw Cu-Sn equilibrium diagram upto 30% Sn showing different regions.

b) Explain the phenomenon of season cracking in Brass.

c) Explain the process of modification of Al-Si alloy with the help of Al-Si equilibrium diagram.

d) Why duralumin rivets are kept in deep freeze before they are put to use.

e) What are Babbitts?

f) Draw schematic ray diagram of metallurgical microscope and indicate different parts through which rays travel.

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

a) Explain the phenomenon 'Dezincification' in brasses.

b) Write briefly about order-disorder transformation in brasses with relevant portion of Cu-Zn equilibrium diagram.

c) Give composition properties and application of typical LM series alloy like say LM 6 or other.

d) What is the main purpose of precipitation hardening in Al-Cu alloy is the treatment different than modification in Al-Si alloy? How?

e) Write short note on microstructure of Babbitts. What is special about it?

f) What is special about metallurgical microscope? What does an etchant do? What is the purpose of polishing?

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **MEE406**
COURSE NAME :- **HYDRAULIC MACHINERY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **29 / 04 / 2017**

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) Calculate specific weight and density of one litre liquid which weights 8.25N.

b) Convert 3.5 bar pressure in to equivalent mercury column.

c) Define i) Steady flow ii) Uniform flow.

d) Define Dynamic viscosity. State its unit.

e) Write the equation for discharge through orifice meter.

f) What are the limitations of Bernoulli's theorem?

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

a) Explain the phenomenon of capillary rise with reference to surface tension.

b) Define i) Pressure head ii) Pressure intensity
iii) Absolute pressure iv) Atmospheric pressure.

c) A circular plate of diameter 1m is immersed in water in such a way that the least depth of immersion is 0.5m and maximum depth of immersion is 1m. Find the depth of centre of pressure. Also find the total pressure on the plate.

d) A pitot tube directed in to a water stream having a velocity of 2.7 m/sec. It has gauge difference of 30mm on the water mercury manometer find its coefficient.

e) A 60mm diameter orifice is discharging water under head of 9 meters. Calculate the actual discharge through the orifice in liters per second and actual velocity of the jet in m/sec at vena-contracta. Take cd = 0.625 and Cv = 0.98.

f) A pipeline consists of a 10cm diameter pipe of length 105m connected to 7.2cm diameter pipe of length 68m. Water is flowing through the pipe at the rate of 22 lit/sec. If F= 0.002 determine major losses and minor losses.

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

a) Find the Kinematic viscosity of lubricating oil whose specific gravity is 0.93 and viscosity is 0.1 N-s/m^2.

P.T.O.

b) Explain Bourdon tube pressure gauge with neat sketch.

c) A simple U tube manometer containing mercury is connected to a pipe in which an oil of specific gravity 0.85 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to atmosphere. Find the vacuum pressure in the pipe. If the difference of mercury levels in two limbs is 260mm and height of oil in left limb from centre of pipe is 170mm below.

d) A pipe through which a liquid of specific gravity 0.89 is flowing is having diameters 40cm and 20cm at section-1 and section -2 respectively. The velocity of the liquid at section -1 is 5m/s. Find the velocity at section-2 and discharge.

e) State laws of fluid friction for laminar flow.

f) With the help of neat sketch, explain Hydraulic Gradient line and Total Energy line.

Section – II Marks

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

a) Find the force exerted by a jet of water of dia 75mm on stationary flat plate, when the jet strikes normally with velocity of 20m/s.

b) Define Hydraulic turbine and pump.

c) Define the term specific speed of a turbine and unit speed.

d) What is slip in case of reciprocating pump? When is the slip negative?

e) Why priming is necessary for centrifugal pumps?

f) What is the use of air vessel in reciprocating pump?

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

a) A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/s. the plate is moving with velocity of 6m/s in the direction of jet find
i) Force exerted by jet on plate ii) Work done by the jet on the plate per sec.

b) Differentiate between impulse turbine and reaction turbine.

c) Classify Hydraulic turbines.

d) Two jets strike the buckets of a Pelton wheel which is having shaft power as 15450kW. The diameter of each jet is given as 200mm. If the net head on the turbine is 400m. Find the overall efficiency of turbine. Take C_v =1.0.

e) Explain with neat sketch multistaging of centrifugal pumps.

f) Explain with neat sketch working of reciprocating pump.

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

a) Define the terms related to centrifugal pump
i) suction head ii) Delivery head iii) Manometric Head iv) Static Head.

b) Differentiate between centrifugal pump & reciprocating pump.

c) A single acting reciprocating pump running at 50rpm delivers 0.01 m^3/s of water. The dia of piston is 200mm and stroke length 400mm. Determine
i) Theoretical discharge of pump ii) Co-efficient of discharge
iii) Slip & percentage slip of pump.

d) What is a draft tube? What are the functions of draft tube? Sketch any one type of draft tube?

e) Explain which neat sketch Kaplan turbine.

f) Draw neat sketch of layout of Hydroelectric power plant. Show gross head and net head in the figure.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE304**
COURSE NAME :- **EXTRACTIVE FERROUS METALLURGY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **24 / 04 / 2017**

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) Give a brief account of modern iron making.

b) What is sponge iron and wrought iron?

c) State the requirements of blast furnace coke.

d) Describe evaluation methods of iron ores.

e) Give approximate compositions of blast furnace slag and flue gases.

f) Describe the role of flux in the blast furnace.

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

a) What is burden preparation of blast furnace?

b) Describe chemical reactions in blast furnace.

c) State the effect of increased top pressure in blast furnace.

d) Explain general irregularities in blast furnace operation.

e) Draw a charging arrangement of blast furnace.

f) Describe the working of blast furnace stove.

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

a) Describe the movement of materials in blast furnace and the reactions thereby.

b) Explain two modern practices in blast furnace operation.

c) Describe the various base of efficiency calculation of blast furnace.

P.T.O.

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

a) Define primary and secondary steel making.

b) Differentiate between acid and basic Bessemer process.

c) State the principle of refractory. What refractories are used in steel melting furnaces?

d) State the factors considered for efficiency of steel making process.

e) State the principle of Direct and Indirect Arc furnace.

f) What are the advantages of continuous casting?

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

a) Explain carbon reaction in decarburization.

b) Describe the Bessemer converter process with construction and operations.

c) Differentiate between VAR & ESR process.

d) State the advantages of secondary steel making.

e) Distinguish between open hearth and Bessemer process.

f) Explain AOD decarburization process.

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

a) Describe the vertical type continuous casting process with diagram.

b) Explain L.D. converter process in oxygen steel making.

c) Describe open hearth process with construction and operation.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE307/MG207**

COURSE NAME :- **ELECTRICAL ENGG. & ELECTRONICS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **25 / 04 / 2017**

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 o 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 and give its expression.

b) Give any two salient features of dynamometer type instruments.

c) Enlist various types of welding.

d) Define the term earthing.

e) Give S.I. Units of power and energy.

f) Enlist names of various measuring instruments.

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

a) With neat diagram draw and explain Faraday's law's of electromagnetic induction.

b) Explain operating principle of PMMC type instrument.

c) Draw and explain ARC welding.

d) Enlist various applications of electric heating (any four)

e) Why the power Factor improvement is needful? Explain in detail.

f) Draw and explain resistance heating in detail.

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

a) For using heavy electric equipments which type of safety is to be taken? Explain in detail.

b) Explain the working principle of eddy current heating.

c) Enlist any four advantages of electric heating.

d) Explain working principle of MI type instrument.

e) Give description of induction the single phase energy meter.

f) Explain right hand grip rule with figure.

P.T.O.

Section – II

Marks

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

a) Draw symbol for NPN transistor and PN junction diode.

b) State function of transducer and give its type.

c) Differentiate between analog measuring instruments and digital measuring instruments on any two points.

d) Define the terms: conductor and semiconductor.

e) Draw symbol and truth table for OR-gate.

f) Convert $(10)_{10}$ into hexadecimal.

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

a) Explain the criteria for selection of transducers.

b) With neat block diagram, explain a dual slope integrating type DVM.

c) Explain binary and hexadecimal numbering system with example.

d) With neat diagram, explain any one type of temperature transducer.

e) State any four advantages of electronic measuring instruments.

f) Draw and explain construction of PN-junction diode.

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

a) Perform addition of following :-

i) 11011 + 01111 ii) 11010 + 11010 iii) 11000 + 00011 iv) 00001 + 00001.

b) Draw and explain any one type of pressure transducer.

c) Explain the concept of active and passive transducers with example.

d) Explain the principle of operation of digital frequency meter.

e) Give any four specifications of BJT with proper ratings.

f) Draw block diagram of digital multimeter. Explain function of any two blocks.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FOURTH** PROGRAM: **MATALLURGY**

COURSE CODE:**MTE412** COURSE NAME: **ENVIRONMENTAL PROTECTION IN MET.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **25 /04/2017**

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 measurement units of noise.
b) Explain domestic sources of noise pollution.
c) Name harmful gases evolved from foundries.
d) Define Ecosystem.
e) Write the names of process in foundries responsible for air pollution.
f) Name the process gases evolved from hot rolling mills.

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

a) Write classification of pollution & pollutants.
b) Explain generation of harmful substances, Evolved from foundries.
c) Write about general characteristics of harmful gases evolved from foundries.
d) Write about harmful substances evolved from picking baths.
e) Write process & non process gases evolved in hot rolling mills.
f) Explain noise pollution with its sources & effects .

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

a) Write about generation of dust evolved from steel foundries.
b) Explain conclusion & Recommendations for reducing air pollution.
c) Write about Acid rain in detail.

Section – II **Marks**

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

a) Define secondary treatment.
b) Define solid waste.
c) What is meant by pyrolysis.
d) Write down the control measure of radiation pollution.
e) Define radiation pollution.
f) What is the EIA.

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

a) Write a short note on Treatment ponds.
b) Explain Disinfection method in wastes water treatment.
c) Write a short note on final disposal of hazardous wastes.
d) Explain 3R.
e) Discuss the different stages in EIA
f) What are the benefits of Environmental audit.

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

a) Discuss in brief waste water treatment process.
b) Explain Activated sludge.
c) Write down the hazardous waste management.
d) Explain Incineration.
e) Explain treatment & disposal of radioactive waste.
f) Write a short note on effects of thermal pollution.

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY-2017

EXAM SEAT NO. | | | | | | |

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

COURSE CODE:**MTE306.** COURSE NAME: **FOUNDRY TECHNOLOGY-I**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **26/04/2017**

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 if necessary.
7) Use of Mobile is strictly prohibited.

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

a) State different types of foundry.

b) Write two advantages of casting process over other manufacturing process.

c) State names of different unit in Foundry Industry.

d) State the various allowances over pattern.

e) List the various pattern making materials.

f) State role of core print.

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

a) Write down two advantages and disadvantages of epoxy resin as pattern materials.

b) What is mean by 'Master pattern?' State its usefulness.

c) Explain Split pattern.

d) List various sand testing methods. Explain method to determine clay content in sand.

e) Explain working of Green sand moulding process.

f) Explain why sand preparation or conditioning requires?

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

a) List various used in sand preparation. State advantages of organic blinder over inorganic.

b) Explain Mechanism of CO_2 moulding process.

c) Write advantages and disadvantages of shell moulding process.

d) Explain investment casting method in term of woruing and one application.

e) Distinguish between Green sand moulding and dry sand moulding process.

f) Write advantages of sand moulding process other moulding process.

P.T.O.

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

a) What is gravity die casting?

b) Write the principle of Centrifugal casting?

c) What is stack moulding?

d) Write the types of Cupola. Which is most efficient?

e) Suggest suitable moulding process cylinder head casting. Justify.

f) Why slush casting process is used for making statues?

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

a) Explain the process continuous casting.

b) Write advantages & disadvantages of centrifugal casting.

c) Draw a neat sketch of cupola furnace and explain its charging procedure.

d) What is the principle of Induction furnace? Why induction furnace has replaced all other furnaces?

e) Describe ceramic moulding process.

f) Suggest suitable moulding process for the following castings. Justify your selection (any two)

1) Cylinder block - 1000 nos.
2) Lathe bed -10 nos.
3) Piston ring - 80000 nos.
4) Gearbox housing -10000 nos.

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

a) Draw a neat sketch of Direct arc-furnace & explain its working. What are the advantages & disadvantages of direct arc furnace?

b) Differentiate between low pressure & high pressure die casting.

c) Explain in brief

1) No bake –two part & three part.
2) Cupola-lining practice.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE503/MG402**
COURSE NAME :- **INDUSTRIAL ORGANIZATION & MANAGEMENT**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **26 / 04 / 2017**

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 o 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 management.

b) What is role of Teamwork?

c) List four qualities of Leader.

d) List four public sector Business houses in India.

e) What is risk?

f) Why adaptive Decision is important?

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

a) List scopes and Importance of management.

b) Explain why Teamwork is important.

c) What are the level of management? Explain role in brief.

d) Write in brief about three approaches in motivation.

e) What are hurdles for effective communication?

f) What is primary method of control? Explain in brief.

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

a) i) Compare co-operatives sector with public sector.

ii) Compare Individual proprietorship with partnership.

b) What are types of decision-making? Explain any two.

c) What is concept of decision-making, and explain problems in rational decision-making?

P.T.O.

Section – II	Marks

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

a) State the importance of materials management.

b) Define I.O.Q.

c) Define the term 'finance'.

d) State the importance of safety.

e) Define i) Node ii) Activity.

f) Enlist various time estimates.

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

a) Describe ABC analysis.

b) Enlist advantages of good material handling.

c) Write about MRP module.

d) Define the term working capital. Describe various sources of raising finance.

e) List various financial institutions. Describe their role in financial management.

f) How will you maintain the balance of capitalization?

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

a) Define the term 'Accident'. Prepare an Accident report of a mishap happened if you were in the capacity of supervisor.

b) Enlist the provisions of factory act.

c) Enlist advantages of linear programming.

d) Differentiate between PERT and CPM.

e) Write about BPR in short.

f) Describe various time estimates.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **CE/ME/SM/MT**

COURSE CODE: **CCF101/CCE101/X102/X108/R103/R104**

COURSE NAME: **ENGINEERING PHYSICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **26/04/2017**

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.

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

a) Define stress and state its types.

b) State stoke's law of viscosity. Write formula for the same.

c) Define i) Density ii) compressibility

d) What is effect of temperature and impurity on surface tension of liquid?

e) Write any two characteristics of linear SHM.

f) Define i) nanometer ii) nanoparticle.

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

a) Explain stress-strain curve for a wire under continuously increasing load.

b) Define viscosity and velocity gradient. State Newton's law of viscosity.

c) Derive an expression for surface tension by capillary rise method.

d) Write any four applications of surface tension.

e) Distinguish between free oscillations and forced oscillations (any four points)

f) Define nanostructured material and write its three examples.

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

a) Write any four applications of viscosity.

b) State significance of angle of contact.(any four points)

c) Distinguish between transverse wave and longitudinal wave (any four points)

d) Define the following terms.

i) Periodic motion

ii) Forced oscillations

iii) Wave

iv) Resonance

e) State any four applications of nanotechnology in space.

P.T.O

f) A wire of length 2m extends by 3mm when a force of 1.8N is applied to it calculate

i) Stress produced in it if $Y=2x10^{11}N/m^2$

ii) Area of wire

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

a) Define echo & reverberation

b) Define ultrasonic wave.

c) State any two properties of X-rays.

d) State Ohm's law.

e) State Snell's law of refraction.

f) What is meant by LASER?

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

a) State any four requirements of good acoustics of building.

b) Explain the production of X-rays using collidge tube.

c) Derive Einstein photoelectric equation.

d) Derive expression for equivalent resistance when number of resistance are connected in series.

e) State four properties of LASER.

f) Explain with neat ray diagram, refraction through glass prism.

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

a) Three resistances are 1, 2 & 3 Ohms. Find the ratio of their effective resistance when connected in series to that connected in parallel.

b) State any four characteristics of photoelectric effect.

c) Derive prism formula.

d) What is Planck's hypothesis? Define threshold frequency of radiation.

e) State applications of LASER (any four)

f) Explain the production of ultrasonic wave using magnetostriction method.

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`GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **THRID** PROGRAM: **METALLURGY**

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

MAX. MARKS: **80** TIME: **3 HRS.** DATE:**27/04/2017**

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.

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

a) What is roll of filler metal in welding?

b) List the joining processes other than welding.

c) List the types of welding torch.

d) Give the classification of cold welding process.

e) What is O_2-C_2H_2 welding?

f) State the principal of seam welding.

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

a) Give the classification of welding.

b) Explain the technique which is used to join railway line.

c) Distinguish between consumable electrode & non consumable electrode.

d) Explain solid state welding? List the types.

e) Give the classification of flame & explain neutral flame with its uses.

f) Explain Arc welding with its application & advantages.

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

a) Explain MIG & Give its advantages.

b) State the principal of SMAW & explain in brief.

c) Explain in brief electrode slag welding.

d) State the types of resistance welding & explain spot welding?

P.T.O

e) State & explain laser beam welding with its applications.

f) List the types of welding techniques & explain forhand (Forward) welding technique.

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

a) List post treatment of welding? Why it requires.

b) List various types of welded Joint. Why they requires?

c) Why welded structure is called Hetrogeneous?

d) 'Heat affected zone is defect' Justify the statement.

e) Give composition and uses of any one Braze alloys.

f) Braze joint is more powerful than solders joint why?

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

a) Explain various zones in welded joint structure with heat diagram.

b) Explain method to minimize length of Heat affected zone.

c) What is Tinmann's solder? State its properties & uses.

d) Distinguish between Hard & soft solders.

e) State role of flux material in Brazing. Explain when brazing is preferred.

f) List various NDT used for inspection of weld. State advantage of NDT over destructive Testing.

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

a) Explain any one destructive test carried on weld inspection in term of working & conclusion.

b) Explain any one welding defect in term of causes and remedies.

c) Explain working of electrochemical machining.

d) Explain mechanism of electro discharge machining.

e) Explain advantages of cold forging.

f) Explain limitation of cold forging process.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **COMMON**

COURSE CODE: **EEE305/IEE301/ETE301/ITE301/EE201/IX201/EJ201/IT201/IE201/IF201/201**

COURSE NAME: **APPLIED MATHEMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **08/05/2017**

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.

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

a) Evaluate $\int \left[e^{2\log x} + e^{x\log a}\right] dx$

b) Find $\int \frac{\sin\sqrt{x}}{\sqrt{x}} dx$

c) Evaluate $\int \frac{dx}{3+2x-x^2}$

d) Evaluate $\int_1^2 \frac{dx}{3x-2}$

e) Evaluate $\int_1^e \log x dx$

f) Find mean value of y=cosx over the range from $x = \frac{-\pi}{2}$ to $x = \frac{\pi}{2}$

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

a) Evaluate $\int \frac{dx}{(x^2+4)(x+1)}$

b) Evaluate $\int \frac{dx}{3\sin 2x + 2\cos 2x}$

c) Evaluate $\int \frac{x+2}{\sqrt{x^2+5x+6}} dx$

d) Evaluate $\int_0^{\pi/4} \log(1+\tan x) dx$

e) Evaluate $\int_1^3 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5}+\sqrt[3]{9-x}} dx$

f) Using integration find the area of the circle $x^2 + y^2 = 16$

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

a) Evaluate $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt[n]{\cot x}} dx$

b) Evaluate $\int \frac{3\sin x + 4\cos x}{2\sin x - \cos x} dx$

P.T.O

c) Evaluate $\int \cos\sqrt[3]{x}\, dx$

d) Evaluate $\int \frac{dx}{4\cos^2 x + 9\sin^2 x}$

e) Find R.M.S value of the I=10sin100πt over a complete period.

f) Find the area enclosed by the parabola $y = x^2 - 5x + 15$ and the line $y - 3x = 3$.

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

a) From the differential equation whose solution is y=acos3t+bsin3t

b) State order and degree of $y = \frac{dy}{dx} + \frac{c}{dy/dx}$

c) Show that $y^3 \sec^2 x\, dx + (3y^2 . \tan x - \sec^2 y)dy = 0$ is exact.

d) Find x and y satisfying the equation $(2+i)x + (i-3)y = 4$

e) Find the value of $i^{49} + i^{68} + i^{89} + i^{110}$

f) Find the complex conjugate of $\frac{3+5i}{1+2i}$

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

a) Solve: $\frac{dy}{dx} - \frac{2}{x}y = x^2 e^x$, if y=0 when x=1

b) Solve: $(e^x + 2x^2 y + y^3)dx + (a^y + 2x^2 y + 3xy^2)dy = 0$

c) Solve : $x^2 y dx = (x^3 + y^3)dy$

d) Express $1+i$ *in* $(x+iy)$ form.

e) Simplify using De Moivre's Theorem $\frac{(\cos 2\theta + i\sin 2\theta)^3 (\cos 3\theta - i\sin 3\theta)^4}{(\cos\theta + i\sin\theta)^2 (\cos 2\theta - i\sin 2\theta)^{-3}}$

f) If $\cos(x+iy) = \alpha + i\beta$ show that *i)* $\frac{\alpha^2}{\cos^2 x} - \frac{\beta^2}{\sin^2 x} = 1$ *ii)* $\frac{\alpha^2}{\cosh^2 y} + \frac{\beta}{\sinh^2 y} = 1$

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

a) Solve $\frac{dy}{dx} = \sin(x+y)$

b) Solve $\frac{dy}{dx} = \frac{xy}{(1-x)(1+y)}$

c) If the slope of the curve is $x^2 + 2x + 1$, find its equation if it passes through the point (1, 1)

d) Find 2 values of $(1-i)^{1/2}$

e) Using Euler's formula, prove the following

i) $\sin 2\theta = 2\sin\theta\cos\theta$

ii) $\cosh^2 x + \sinh^2 x = \cosh 2x$

f) Show that $\sqrt{3+i}$ is a cube root of $8i$

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **COMMON**

COURSE CODE:

CEE301/MEE301/SME301/MTE301/CE201/ME201/SM201/MT201/C201/M201/1201/2201

COURSE NAME: **APPLIED MATHEMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **08/05/2017**

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.

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

a) Evaluate $\int\left[e^{2\log x}+e^{x\log a}\right]dx$

b) Find $\int\frac{\sin\sqrt{x}}{\sqrt{x}}dx$

c) Evaluate $\int\frac{dx}{3+2x-x^2}$

d) Evaluate $\int_1^2\frac{dx}{3x-2}$

e) Evaluate $\int_1^e\log x dx$

f) Find mean value of y=cosx over the range from $x=\frac{-\pi}{2}$ to $x=\frac{\pi}{2}$

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

a) Evaluate $\int\frac{dx}{(x^2+4)(x+1)}$

b) Evaluate $\int\frac{dx}{3\sin 2x+2\cos 2x}$

c) Evaluate $\int\frac{x+2}{\sqrt{x^2+5x+6}}dx$

d) Evaluate $\int_0^{\pi/4}\log(1+\tan x)dx$

e) Evaluate $\int_1^3\frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5}+\sqrt[3]{9-x}}dx$

f) Using integration find the area of the circle $x^2+y^2=16$

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

a) Evaluate $\int_{\pi/6}^{\pi/3}\frac{1}{1+\sqrt[n]{\cot x}}dx$

b) Evaluate $\int\frac{3\sin x+4\cos x}{2\sin x-\cos x}dx$

c) Evaluate $\int\cos\sqrt[3]{x}\,dx$

d) Evaluate $\int\frac{dx}{4\cos^2 x+9\sin^2 x}$

e) Find R.M.S value of the I=10sin100πt over a complete period.

f) Find the area enclosed by the parabola $y=x^2-5x+15$ and the line $y-3x=3$.

P.T.O

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

a) Form the differential equation by eliminating arbitrary constants if $y = A\cos 3x + B\sin 3x$

b) Solve $\sqrt{1-y^2}\,dx = \sqrt{1-x^2}\,dy$

c) state order and degree of the differential equation $\sqrt{1+\frac{dy}{dx}} = \frac{d^2y}{dx^2}$

d) Find range of the following data: 49, 13, 11, 12, 42, 29, 18, 27.

e) Find the probability of getting a sum of 3 when 2 unbiased dice is thrown.

f) The velocity of a body is given by $v = t(3+5t)$. How much distance does it travel in 4sec if it was initially at rest?

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

a) Solve: $\cos^2 x\frac{dy}{dx} + y = \tan x$

b) Solve: $v\frac{dv}{dx} = g - kv^2$ Where g and k are constants.

c) Solve: $(x+y+1)^2\frac{dy}{dx} = 1$

d) Calculate mean deviation about mean of the following data

Marks	3	4	5	6	7	8
No. of student	1	3	7	5	2	2

e) Calculate variance

C.I	0-10	10-20	20-30	30-40	40-50	50-60
fi	14	23	27	21	15	19

f) A husband and wife appeared for an interview for two vacancies in an office. The probability of husbands' selection is $\frac{2}{7}$ and that of wife selection is $\frac{1}{4}$. Find the probability that

i) Both of them are selected.

ii) Only one of them is selected.

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

a) If A and B are two events such that P(A)=0.8, P(B)=0.6, P(A∩ B)=0.5, find i) P(AUB) ii) $p(\frac{A}{B})$ iii) $p(\frac{B}{A})$

b) Solve: $(2xy + y - \tan y)dx + (x^2 - x\tan^2 y + \sec^2 y)dy = 0$

c) Solve: $y\,dx = xdy + \sqrt{xy}\,dx$

d) Find the equation of curve whose slope at any point is equal to $\frac{2y+x+1}{x}$ and which passes through the point (1, 0).

e) The mean weight of 150 students is 60kg. The mean weight of boys is 70kg with a S.D of 10kg. For the girls, the mean weight is 55kg. and the S.D is 15kg. Find the number of boys and the combined S.D.

f) The following table shows the marks obtained by 100 students in an examination. Calculate mean and variance.

Marks	1-10	11-20	21-30	31-40	41-50	51-60
No.of candidates	3	16	26	31	16	08

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY-2017

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD.** PROGRAM: **CE/ME/SM/MT.**

COURSE CODE: **CEE313/MEE313/MTE312/SME312/ME214/MG228/R228.**

COURSE NAME: **HIGHER MATHS.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **05/05/2017**

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 if necessary.
7) Use of Mobile is strictly prohibited.

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

a) Prove that $\Delta\nabla = E + E^{-1} - 2$

b) Show that $(\frac{\Delta^2}{E})x^3 = 6x, if\ h = 1.$

c) Write Lagrange's interpolation formula for $x = x_3$

d) If $u = f\left(\frac{x}{y}\right) + \sqrt{x^2 + y^2,}\ \ find\ \frac{\partial u}{\partial x}$

e) If u=f(v) where v is a homogeneous function of x, y of degree n, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = nv\, f^1(v).$

f) If x=ucosv, y=usinv find Jacobian, $J\left(\frac{x,y}{u,v}\right)$

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

a) Using Lagrange's interpolation formula, find the polynomial which takes the values as

x	0	1	2
y	1	4	6

b) Given :

x	10	15	20
f(x)	14	18	28

Estimate f(12) using Newton's forward interpolation formula.

c) Given :

x	0^0	30^0	60^0	90^0
$Cosx^0$	1	0.87	0.5	0

Find $cos75^0$ using Newton's backward difference interpolation formula.

d) If u= f(r) & $r^2 = x^2+y^2+z^2$, prove that, $\frac{\partial^2 y}{\partial x^2} + \frac{\partial^2 y}{\partial y^2} + \frac{\partial^2 y}{\partial z^2} = f''(r) + \frac{2}{r}f'(r)$

e) If u=sin $(\frac{xy+yz+zx}{x^2+y^2+z^2})$ prove that, $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$

f) If $u=x+2y^2-z^3$, $v=x^2yz$, $w=2z^2-xy$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.

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

a) Given f(0)=3,f(1)=6,f(2)=11,f(3)=18, estimate f(1.5) using Lagrange's interpolation formula.

P.T.O

b) Find f(4.5) from the following data.

x	1	2	3	4	5
f(x)	2.38	3.65	5.85	9.95	14.85

c) Using Newton's forward difference interpolation formula find f(8) from the data

x	5	10	15	20
f(x)	50	70	100	145

d) If $x = r\cos\theta$, $y = r\sin\theta$, prove that $JJ^1 = 1$

e) If $z = x^2 + \tan^{-1}(\frac{y}{x}) - y^2 tan^{-1}(\frac{x}{y})$, prove that, $\frac{\partial^2 z}{\partial x \partial y} = \frac{x^2 - y^2}{x^2 + y^2}$

f) Verify Euler's formula for the function $Z = \sin^{-1}[\frac{x^2 + y^2}{x + y}]$

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

a) Find L(cos5t cost)

b) Find L $\left(\frac{(3t^2+t)^3}{t^2}\right)$

c) Find L $(2te^{2t})$

d) Find L^{-1} $(\frac{3+2s+s^2}{s^3})$

e) Find L^{-1} $(\frac{3s-12}{s^2+8})$

f) Solve $\frac{d^2x}{dt^2} + \frac{2dx}{dt} + 1 = 0$.

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

a) Evaluate $\int_0^\infty e^{-3t} t\cos 2t \, dt$ *by L.T.*method.

b) Find $L^{-1}\left(\frac{4s+5}{(s-1)^2(s+2)}\right)$.

c) Find $L^{-1}\left(\frac{1}{s(s^2+4)}\right)$ by Convolution theorem.

d) Solve $\frac{dy}{dt} + y = e^{-3t}\, y(0) = 1$.

e) Solve $\frac{d^4y}{dx^4} + 4y = 0$.

f) Solve $(D^3 - 4D^2 + 13D)y = 0$

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

a) Find L $(te^{-t}\sin 3t)$

b) Find L^{-1} $\left(\frac{1}{(s^2+4)^2}\right)$ by Convolution theorem

c) Find $L^{-1}\left(\frac{s+3}{(s^2+4s+13)}\right)$ by Convolution theorem

d) Solve $\frac{dx}{dt} = 1 + e^t, x(0) = -1$.

e) Solve $\frac{d^3y}{dx^3} - \frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 5y = 0$.

f) Solve $(D^4+2D^2+1)\, y=0$.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **CE/ME/IE/SM/MT/E & TC**

COURSE CODE :- **MEE312/MTE311/IEE311/ETE311/MG227/R227**

COURSE NAME :- **NON CONVENTIONAL ENERGY SOURCES**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **05 / 05 / 2017**

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) Enlist any four renewable energy sources.

b) How energy sources are classified?

c) Define: Power Coefficient.

d) State the basic principle of wind energy conversion.

e) State the categories in which biomass resources fall.

f) State different biomass conversion technologies.

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

a) Why alternative energy sources are necessary?

b) Define : i) Hour angle ii) Declination iii) Azimuth angle iv) Zenith angle.

c) Describe the prospects of alternative energy sources.

d) Draw a block diagram showing basic components of wind energy conversion system.

e) Differentiate between biomass and conventional fuel.

f) How Wind Mills are classified?

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

a) Explain with neat sketch, Deenbandhu biogas plant.

b) What factors are considered for selection of site of Wind Mill?

c) Explain with neat sketch solar pond.

P.T.O.

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

a) How should be the site, favorable for a tidal power plant?

b) What are the difficulties in tidal power plant?

c) State two advantages and disadvantages of geothermal energy over other energy forms.

d) State the principles of Energy conservation.

e) State the meaning of the term ' Simple Pay back Period'.

f) What is fuel cell? State the main components.

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

a) Explain single basin and double basin arrangement of tidal power plant.

b) Describe the working and main types and OTEC power plants.

c) Write four advantages and four limitations of small scale hydroelectric power generation.

d) Explain Geothermal energy power plant.

e) Draw a simple MHD generator and explain principle of MHD power generation.

f) Write various components of SHP and state their functions.

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

a) Write classification of small hydro power station. State type of turbine suitable for micro hydel plant and explain.

b) Explain the concept of waste heat utilization.

c) State the types of energy audit and explain in short.

d) Explain the meaning of Co-generation and its benefits in industries.

e) Discuss the energy conservation technologies.

f) Draw and explain Sankey diagram for energy audit of a factory.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM April/ May 2017

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE406/MG306**
COURSE NAME :- **POWDER METALLURGY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **06 / 05 / 2017**

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 o 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 one advantages and one disadvantage of powder metallurgy.

b) Define 'Compressibility'.

c) Write 'classification of powder production method'.

d) How powder particle distribution influence the properties.

e) What is powder metallurgy?

f) Which metal or alloy suitable for production of powder by shotting method.

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

a) Compare and contrast powder method with other shaping or forming method.

b) Explain mechanical powder production method.

c) Explain chemical method of powder production with one suitable example.

d) Explain density of metal powder.

e) Explain concept of surface area of metal powder.

f) Explain why powder metallurgical technique is indispensable for certain type of products.

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

a) Explain 'thermal decomposition' method.

b) Explain 'Electro-chemical process' with suitable example.

c) Explain concept of surface energy in powder metals.

d) Explain annealing treatment on powder with significance.

e) What is conditioning? Write effect of conditioning on metal powder.

f) Explain size, shape, distribution of metal powder.

P.T.O.

Section – II	Marks

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

a) Write two objectives of compacting process.

b) What is Isostatic pressing?

c) What is powder extrusion?

d) List the electrical contact materials manufactured by powder metallurgy.

e) What is sintering?

f) What are cemented carbides?

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

a) Explain double action floating die compaction with neat sketches.

b) What is sintering? Explain Grain boundary Diffusion mechanism.

c) Explain iso-static pressing characteristics, advantages and application.

d) Differentiate between impregnation and infiltration.

e) What is the role of lubricant in powder compaction? Name the lubricants.

f) Explain any one sintering furnace in details with zones.

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

a) State various types of pressure shaping techniques with heat and explain any one.

b) State the different mechanisms of sintering. Explain transport mechanism in short.

c) Explain the sintering atmosphere.

d) Differentiate between mechanical and hydraulic presses.

e) Explain infiltration with advantages and disadvantages.

f) Explain powder extrusion in brief.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM APRIL/MAY -2017

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCF106/CCE106/X110/R108/0108**

COURSE NAME: **ENGINEERING MATHEMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **06/05/2017**

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.

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

a) Find the centroid of a triangle whose vertices are (1, 4) (2, 3) (0, -1)

b) Find the distance between the parallel lines $3x+2y-8=0$ and $3x+2y-4=0$

c) Find the acute angle between the lines $3x-2y+4=0$ *and* $2x-3y-7=0$

d) Find the equation of a circle whose center is at origin and radius 5

e) Find the equation of a circle whose diameter is the line segment joining the points (9, 0) & (0, 6)

f) Starting with the approximations $x_0=y_0=z_0=0$, for solving a set of equations by Gauss-Seidel method. If the next approximation gives $x_1=0.85,\ y_1=1.0275$. Find z_1. Given that $z=\frac{1}{10}[25-2x+3y]$

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

a) Show that the points (-2, 1), (-1, 3) and (1, 7) are collinear.

b) Determine which of the two circles is greater: $x^2+y^2-3x+4y=0$ and $x^2+y^2-6x+8y=0$

c) Find the equation of a circle passing through the point (2, 5) and (-5, 4) and whose center lying on the line $2x-3y+5=0$

d) Find the equation of a line passing through the points of intersection of the lines $2x+3y=13,\ 5x-y=7$ and passing through (1, -1)

e) Find the equation of perpendicular bisector of the join of A(-2, 3) and B(8, -1)

f) Use Jacobi's method to solve the equations $5x+2y+z=12,\ x+4y+2z=15,$ $x+2y+5z=20$ (Third iterations only)

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

a) Using Gauss Seidel method solve $10x=2y+2z+6,\ 10y=x+2z+7,$ $10z=x+y+8$ (upto Third iterations)

b) Using Jacobi's method solve $5x-y-2z=-3,\ 3x+5y-z=10,\ -2x-y+4z=8$ (three iterations only)

c) Use Regula-Falsi method to solve $x^3-3x+5=0$ (upto second approximation)

d) Find $\sqrt[3]{29}$ by Regula-Falsi method upto second iteration

e) Find the square root of 12 by the method of bisection (upto 4 approximations)

f) Solve $x^3-6x+2=0$ by Bisection method (upto four iterations)

P.T.O

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

a) Test whether the function is even or odd if $f(x) = x^3 + 5\sin x$

b) Evaluate $\lim_{x \to 3} \dfrac{x^3 - 27}{x - 3}$

c) Evaluate $\lim_{x \to 0} \dfrac{\sin 5x}{3x}$

d) Find $\dfrac{dy}{dx}$ *if* $y = \cos^2 x$

e) Find $\dfrac{dy}{dx}$ *if* $y = \log(x^2 + 2x + 5)$

f) Find the slop of tangent to the curve $y = x^3$ *at* $x = 4$

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

a) If $y = f(x) = \dfrac{x+1}{x-1}$, $x \neq 1$ then show that $x = f(y)$

b) Evaluate $\lim_{x \to \frac{\pi}{4}} \dfrac{\sin x - \cos x}{x - \pi/4}$

c) If $y = x^y$ *prove that* $\dfrac{dy}{dx} = \dfrac{y^2}{x(1 - y\log x)}$

d) Find the derivative of $x.\sin^{-1} x$

e) Find $\dfrac{dy}{dx}$ *if* $y = \log\left[x + \sqrt{x^2 + a^2}\right]$

f) Discuss the stationary (Maximum & Minimum values) of $x^3 - 6x^2 + 9x - 2$

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

a) If $f(x) = 16^x + \log_2^x$ then find $f(1/4)$ $f(1/2)$

b) Evaluate $\lim_{x \to 4} \dfrac{x^4 - 64x}{\sqrt{x^2 + 9} - 5}$

c) Differentiate w. r. t x; $\tan^{-1}\left(\dfrac{x}{\sqrt{1 - x^2}}\right)$

d) Find $\dfrac{dy}{dx}$ *if* $13x^2 + 2x^2y + y^3 = 1$

e) If $y = (\sin x)^{\log x}$ *find* $\dfrac{dy}{dx}$

f) If $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$ *find* $\dfrac{dy}{dx}$

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