GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **CCE105/X104/R107/0107** COURSE NAME: **BASIC MATHEMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **30/04/2016**

Instruction:-

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

Marks

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

a) Resolve into partial fractions: $\frac{x+1}{(x+3)(x-2)}$

b) Resolve into partial fractions: $\frac{x}{x^2-1}$

c) Find X if $\begin{bmatrix} 4 & 5 \\ -3 & 6 \end{bmatrix} + x = \begin{bmatrix} 10 & -1 \\ 0 & -5 \end{bmatrix}$

d) Find x & y if $\begin{bmatrix} 3x^2 & 4 \\ 1 & y-3 \end{bmatrix} = \begin{bmatrix} 12 & 4 \\ 1 & 8 \end{bmatrix}$

e) If $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ 4 & 6 \end{bmatrix}$ find 2A+3B-4I

f) Find the middle term in the expansion of $(x+5)^8$

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

a) Solve using determinants: $x+y+z=1;\ \ 2x+3y+z=4;\ \ 4x+9y+z=16$

b) Prove using properties that $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$

c) Resolve into partial fractions: $\frac{x^2+2x}{(x-3)(x^2+1)}$

d) Express the matrix 'A' as the sum of symmetric and skew-symmetric matrices $A = \begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$

e) If $A = \begin{bmatrix} -1 & 3 & 5 \\ 0 & 6 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -5 \\ 7 & 8 \\ 1 & -1 \end{bmatrix}$, $C = \begin{bmatrix} 4 & -5 \\ 1 & 1 \end{bmatrix}$, *verify that* $(AB)C = A(BC)$

f) Find A^{-1} by adjoint method if $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

P.T.O

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

a) Solve the following equation $\begin{vmatrix} x+10 & x+2 & x+3 \\ x+4 & x+5 & x+6 \\ 2x+7 & x+8 & 0 \end{vmatrix} = 0$

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

c) Resolve into partial fractions: $\frac{2x^4+x^2+4}{(x^2+1)(2x^2+3)(x^2-2)}$

d) Solve the following simulations equations by matrix method: 2x+y=3; 2y+3z=4; 2z+2x=8

e) Using Binomial theorem prove that $\left(\sqrt{2}+1\right)^5-\left(\sqrt{2}+1\right)^5=82$

f) The term independent of x in the expansion of $\left(x^3+\frac{m}{x^8}\right)^{11}$ is 1320 find m.

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

a) Prove that as $\cos(\pi+\theta)=-\cos\theta$

b) If A=30^0 verify that $\sin 3A=3\sin A-4\sin^3 A$

c) Express as product and evaluate $\sin 99^0-\sin 81^0$

d) Prove that a=b cos c + C cosB

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

f) In ΔABC if a=125cm, b=123cm, c=62cm find $\sin\frac{A}{2}$

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

a) If $\tan(x+y)=\frac{3}{4}$, $\tan(x-y)=\frac{8}{15}$ *them show that* $\tan 2x=\frac{77}{36}$

b) Prove that $\frac{\sec 8A-1}{\sec 4A-1}=\frac{\tan 8A}{\tan 2A}$

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

d) Prove that $\tan^{-1}\left(\frac{1}{7}\right)+\tan^{-1}\left(\frac{1}{13}\right)=\cot^{-1}\left(\frac{9}{2}\right)$

e) Prove that $\left(b^2-c^2\right)\sin^2 A+\left(c^2-a^2\right)\sin^2 B+\left(a^2-b^2\right)\sin^2 c=0$

f) Solve ΔABC *if* $b=1,\ c=\sqrt{3}-1$ & $A=60^0$

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

a) If α and β both are obtuse angles and $\sin\alpha=\frac{5}{13}$, $\cos\beta=\frac{-4}{5}$ *evaluate* $\cos(\alpha+\beta)$

b) Prove that $4\sin A\sin(60^0-A)\sin(60^0+A)=\sin 3A$

c) Show that $\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{3}{5}\right)=\tan^{-1}\left(\frac{27}{11}\right)$

d) In ΔABC *show that* $\tan A+\tan B+\tan C=\tan A\tan B\tan C$

e) Solve ΔABC in which the sides are a=52.8, b=39.3, c=72.1

f) In any ΔABC, prove that $a\cos\left(\frac{B-C}{2}\right)=(b+c)\sin\frac{A}{2}$

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: THIRD | PROGRAM: METALLURGY

COURSE CODE: MTE304/MG205 | COURSE NAME: EXTRACTION FERROUS METALLURGY

MAX. MARKS: 80 | TIME: 3 HRS. | DATE: 30/04/2016

Instruction:-

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

Marks

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

a) List various ancient Iron making processes.
b) What are the raw materials required for extraction of Iron?
c) State principle of Sintering.
d) Why Iron ore beneficiation is necessary?
e) What is the basic function of a blast furnace?
f) What is meant by Blast furnace slag?

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

a) Which are the recent developments in Iron making process?
b) Why preparation of Iron ores is necessary? Explain any one method of Iron ore preparation.
c) Explain agglomeration of Iron ores.
d) Explain the working of disc and drum pelletiser.
e) Draw a neat labeled diagram of blast furnace showing different zones.
f) Explain the reduction reactions of Mn in blast furnace.

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

a) What is meant by an integrated steel plant? How it is operated?
b) State various properties required in blast furnace coke.
c) Why flux is necessary in Iron making? State the properties of commonly used fluxes.
d) State the function of the following parts of a blast furnace.
   i) Foundation
   ii) Hearth
   iii) Bosh
   iv) Tuyers
e) Explain in brief the operation of blast furnace.
f) What is meant by the basicity ratio of slag? What is the significance of basicity ratio of slag in blast furnace operation.

P.T.O.

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

a) State four advantages of secondary steel making.
b) What are the advantages of ESR process over VAR process.
c) State the principle of open hearth process.
d) Give advantages of Bessemer process.
e) State two distinguishing points between: Acid open hearth & Basic open hearth.
f) Write the principle of Induction Furnace.

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

a) Explain the L.D. process for steel making.
b) Write the various electric process used for steel making & explain Arc furnace with advantages.
c) Explain Perrin process for synthetic slag refining.
d) State the decarburisation methods. Explain the AOD. Process.
e) Distinguish between open hearth & Bessemer process.
f) Describe the operations of Acid Bessemer process.

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

a) Describe the raw materials used for steel making in detail.
b) Describe the laddle furnace for refining & alloying of steel.
c) Explain
i)ESR & VAR process for slag refining.
ii) The curved mold (S type) continuous casting process.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE401/ MG301**
COURSE NAME :- **METAL WORKING PROCESS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **02 / 05 / 2016**

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

Section – I

Marks

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

a) State methods of pointing rods and wires for initial feeding of wire into die.

b) Draw a neat sketch of planetary Mill.

c) What are enimeters?

d) What is th plate, sheet and strip?

e) Write the causes of twisted blooms in rolling.

f) What is collapsible mandrel?

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

a) Explain the purpose of baking in wire drawing.

b) What is Bull block? What are its advantages over draw bench?

c) Explain with a neat sketch forces and Geometrical relationship in Rolling.

d) What is sink drawing and tube drawing?

e) What is the spread during rolling? Explain the factors affecting spread.

f) Explain i) Scab observed in rolling
i) Size range of starting material in wire drawing.

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

a) What is patenting? Write the properties of patented wire.

b) What are common rolling defects ? Describe any three in terms of causes and remedies.

c) Differentiate between Hot Rolling and Cold Rolling.

P.T.O.

Section – II	Marks

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

a) Define forging. What is cold forging and hot forging?

b) Explain the causes of oxidation and decarburisation, during forging of steels.

c) What is spring back? How it occurs and how its effect can be minimised?

d) Differentiate between Direct and Indirect extrusion with respect to the principle, raw materials, capacity of presses, advantages and limitations.

e) With a neat labelled diagram, explain the working of board drop hammer?

f) List any four forging defects. Explain any one with its causes and remedies.

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

a) What is meant by 'Chiseling and punching operation? Explain with neat sketch.

b) What are the properties required in the material for extrusion dies? Give typical compositions of steels used for extrusion dies.

c) With a neat labelled diagram, explain the principle and working of impact extrusion process. What are its applications?

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

a) Which are the various cutting operations of blank for sheet metal working?

b) Write various Hand forging tools.

c) Explain the significance of clearance between die and punch.

d) What is rubber pod bending?

e) What is drawing out operation in forging?

f) Which lubricant is used in extrusion of metals?

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **THRID** PROGRAM: **CE/ME/IE/E&TC/SM/MT/IT**

COURSE CODE:

MEE313/MTE312/ME214/R228/MG228/ITE312/R228/IEE/ETE312/IX/EJ210/R228/0228

COURSE NAME: **HIGHER MATH'S**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **02/05/2016**

Instruction:-

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

Marks

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

a) Evaluate $\left(\frac{\Delta^2}{E}\right)x^2$ *taking* $h=1$

b) Prove that $E\Delta = \Delta E$

c) Prove that $\Delta \log f(x) = \log\left[1+\frac{\Delta f(x)}{f(x)}\right]$

d) If $z=\log(x^2+y^2)$. *find* $\frac{\partial z}{\partial x}$ & $\frac{\partial z}{\partial y}$

e) If $z=x^y$, *then find* $\frac{\partial z}{\partial x}$ & $\frac{\partial z}{\partial y}$

f) If $u=\sin(xy)$, *find* $\frac{\partial^2 u}{\partial x.\partial y}$

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

a) Estimate the missing term in the following table.

x	1	2	3	4	5
y	2	5	7	-	32

b) Express $f(x)=2x^4+x-1$ in factorial notation & find $\Delta^3 f(x)$ *at* $x=1.5$

c) It f(x)is a polynomial of degree 2 in x If f(0)=8, f(1)=12, f(2)=18 then find f(x) using suitable interpolation formula.

d) The following table gives the premium payable for the policy of RS.1000 at age x.

Age	20	25	30	35	40
Premium	23	26	30	35	41

Find the premium, if the policy is taken at the age of 26 years.

e) Find f(1.7), if f(-2)=4, f(-1)=26, f(0)=58, f(1)=112, f(2)=446

f) Using Lagrange's formula, find f(6)

x	3	7	9	10
y	168	120	72	63

P.T.O

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

a) If $z = \sin^{-1}\left(\frac{y}{x}\right)$, *verify that* $\frac{\partial^2 z}{\partial x.\partial y} = \frac{\partial^2 z}{\partial y.\partial x}$

b) If $\sin U = \frac{x^2 y^2}{x+y}$ *show that* $x\frac{\partial u}{\partial x} + y.\frac{\partial u}{\partial y} = 3\tan u$

c) If $u = x^2.\tan^{-1}\left(\frac{y}{x}\right) - y^2.\tan^{-1}\left(\frac{x}{y}\right)$ *show that* $\frac{\partial^2 u}{\partial x.\partial y} = \frac{x^2 - y^2}{x^2 + y^2}$

d) If $x = r\cos\theta,\ y = r\sin\theta,$ *find* $\frac{\partial(x,y)}{\partial(r,\theta)}$

e) If $x = e^U.\cos V$ *and* $y = e^U.\sin V$ *prove that* $\frac{\partial(x,y)}{\partial(U,V)}\ X\ \frac{\partial(U,V)}{\partial(x,y)} = 1$

f) If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$ *then prove that* $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x.\partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \sin 4U - \sin 2U$

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

a) Find L(f(t)) by using definition if $f(t) = 3,\quad 0 < t < 5$
$= 0,\quad t > 5$

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

c) Find $L\left(\cos^3 2t\right)$

d) Find $L^{-1}\left(\frac{2}{s} + \frac{1}{s^3} + \frac{1}{s^2+4}\right)$

e) Find $L^{-1}\left(\frac{1}{(s-3)^3}\right)$

f) Find $\left(D^3 - 1\right)y = 0$

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

a) Find $L\left(t\ e^t \sin 2t \cos t\right)$

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

c) Find by L.T method the value of $\int_0^\infty e^{-3t} t \sin t\ dt$

d) Find $L^{-1}\left(\frac{s+29}{(s+4)(s^2+9)}\right)$

e) Using convolution theorem find $L^{-1}\left(\frac{1}{s(s+4)}\right)$

f) Solve $\frac{d^3y}{dx^3} - 4\frac{d2y}{dx^2} + 5D - 2 = 0$

Q 6) **A)** Attempt Any **TWO** **08**

a) Solve $\left(D^3 - 3D^2 + 4\right)y = 0$

b) Solve $\frac{d^4y}{dx^4} + 6\frac{d^2y}{dx^2} + 9 = 0$

c) Solve $\frac{d^3y}{dx^3} + y = 0$

B) Attempt Any **ONE** **08**

a) Solve by using L.T. Method $\left(D^2 - 3D + 2\right)y = 4e^{2t}$ *given that* $y'(0) = -3$ *and* $y'(0) = 5$

b) $\left(D^2 - D - 2\right)y = 20\sin 2t$ *given that* $y(0) = 1$ *and* $y'(0) = 2$

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **CCE107/X105/E109** COURSE NAME: **ENGINEERING DRAWING-I**

MAX. MARKS: **80** TIME: **4 HRS.** DATE: **29/04/2016**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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7) Use of Mobile is strictly prohibited.

Marks

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

a) Write Auto CAD command for the following
   i) To draw line of 40mm
   ii) To draw circle of radius 25mm

b) State the applications of parabola.

c) If point B is in the V.P. and 35mm above H.P. Draw its projection.

d) Draw conventions/ symbols for the following.
   i) Long brake line
   ii) Center line

e) A 2cm long line on a drawing represents a distance of 1 meter calculate Representative Fraction (R.F)

f) State the uses of the following drawing instrument.
   i) Set squares
   ii) French curves.

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

a) Construct parabola by rectangle method, given the base 100mm and height 70mm.

b) Draw direct (external) common tangent to two unequal circles of radius 25mm and 35mm respectively. The distance between the centers of two circles is equal to 100mm.

c) A string is unwound from a circle of 30mm radius. Draw the Involute of a circles the end of a string for unwinding the string completely. String is kept tight while being unwound.

d) The length of the top view of line parallel to VP and inclined at 45^0 to the H.P is 50mm. One end of the line is 12mm above the HP and 25mm in front of V.P. Draw the projection of the line and determine its true length.

e) Construct an ellipse by Arcs of circle method, given the major axis and minor axis 80mm and 50mm respectively.

f) The distance between end projections of a line PQ 100mm long is 80mm. The line is parallel to H.P. The end P is 15mm above H.P and 35mm in front of V.P Draw projections of line PQ and find inclination with V.P.

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

a) Draw a cycloid of a circle of 50mm diameter.

b) Construct and Archemedian spiral for one convolution, given the greatest and least radii being 70mm and 15mm respectively.

c) A straight line AB 60mm long makes an angle of 55^0 to the H.P and 25^0 to the V.P The one end of the straight line AB is in the H.P and 20mm in front of V.P. Draw the projection of line AB.

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

a) An isosceles triangle of base 30mm and attitude 50mm is having its base on H.P. plane is perpendicular to V.P and is inclined to H.P. in such a way that top view appears to be an equilateral triangle. Draw three views of plane.

b) A circular plate of diameter 60mm is resting on the V.P on a point of its circumference. The plate is inclined to V.P. in such a way that the elevation length of diameter (minor axis) passing through the point on V.P is 35mm, The plate is perpendicular to H.P. Draw its three views of the plate.

c) A pentagonal plate of 30mm side is resting on one of the side on H.P such that plate is inclined at 40^0 with H.P. and perpendicular to V.P. The center of plate is 50mm from V.P. draw its three views.

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

a) A pentagonal prism having base side 30mm and axis 60mm long is resting on H.P on one of its base edge. Draw the projections of prism if the face containing that edge makes an angle of 60^0 with the H.P and its axis is parallel to V.P.

b) A cylinder having its base diameter 40mm and axis length 60mm is kept on the V.P on a point of its base circle such that its axis is inclined to V.P at 30^0 and parallel to H.P. Draw the projections of the cylinder.

c) A square pyramid side of the base 30mm and height 50mm is resting on its base with one of the sides of the base perpendicular to the V.P. It is cut by on AIP inclined at 45^0 to the H.P. in such a way that it bisects the axis. Draw F.V. sectional T.V. and true shape of section

i) F.V. (02 Marks)
ii) Sectional T.V. (02 Marks)
iii) True shape (04 Marks)

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

a) A right circular cylinder of 60mm base diameter and axis 100mm long is resting on the ground on its base. It is cut by a section plane perpendicular to V.P. and inclined to H.P (or ground) in such a way that the true shape of section is an ellipse having major axis 80mm. Draw

i) Front view (02 Marks)
ii) Sectional Top view (02 Marks)
iii) True shape of section (04 Marks)

b) A cone of base diameter 40mm and axis length 50mm is kept on the H.P. on its base. It is cut by an AIP inclined at 45^0 to the H.P. and passes through a point on the axis 30mm above the base. Draw

i) Front view (02 Marks)
ii) Sectional Top view (02 Marks)
iii) True shape of section (04 Marks)

c) A cone of base diameter 40mm and axis length 60mm is kept on the V.P. on a point of its base circle such that its axis inclined to V.P. at 30^0 and parallel to H.P. Draw the projections of cone.

Stage I i) F.V (01 Marks)
ii) T.V (01 Marks)
Stage II i) F.V (03 Marks)
ii) T.V (03 Marks)

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIRST** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE101/MG202**
COURSE NAME :- **FURNACE, REFRACTORY AND PYROMETRY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **04 / 05 / 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 classification of fuel.

b) State the different types of coal.

c) Give two example of solid fuel. State their two uses.

d) Why coking of coal necessary?

e) Which information obtain on proximate analysis of coal?

f) What is mean by 'Gassification'? Give one suitable example.

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

a) Write down two advantages and two disadvantages of solid fuel.

b) Why carborisation of coal to be done? What is products of carborization? State only type of carborisation.

c) Write a short note on 'Diesel' as a liquid fuel.

d) Write a various products obtain through oil refinery at different stages.

e) Write composition and uses of 'Water Gase'.

f) State the principle of 'Induction Melting Furnace'.

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

a) Draw a labelled different parts of cupola furnace. State working at hearth of copola.

b) State classification of Induction furnace. State advantage of Medium frequency.

c) What is refractory? Why it necessary in furnace construction?

d) What is Natural Gas? Write two characteristic and uses.

e) Write advantage and application of Gaseous fuel.

f) Write a short note on 'LPG'.

P.T.O.

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

a) Define refractoriness.
b) Write properties of chromite refractories.
c) State various type of temperature measuring device.
d) State the uses of fireclay refractory bricks.
e) What is meant by Seeback effect?
f) State Stefan'Boltzman's law.

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

a) Write the characteristics of refractory materials.
b) Explain failure due to slagging and abrasion of a refractory.
c) Write the applications of magensite refractory.
d) "$Al_{2O}3$ refractory is recommended for top/root construction of Blast furnace". State true or false and jusify answer.
e) Write construction and working of total radiation pyrometer.
f) Explain resistance pyrometer-principle application.

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

a) Explain how the bulk density and porosity of a refractory are tested.
b) How magnesite refractory is manufactured?
c) State the properties and application of zirconia refractories.
d) Explain metal expansion in a thermometer.
e) Explain copper/ constanton types of base metal thermocouple.
f) What is meant by tempil sticks? How and where it is used?

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE:**MTE310/MG401** COURSE NAME : **METAL JOINING & FORMING PROCESS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **29/04/2016**

Instruction:-

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

Marks

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

a) Define term 'welding'. What are advantage of welding as joining process.
b) Why solder component use below 450^0C.
c) Define term 'weldment'.
d) State classification of welding process.
e) State Name of Radient/Advance energy welding process.
f) State function of welding torch.

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

a) Write down flame appearance of Neutral oxy-acetylene flame. State purpose of external & internal flame w.r.t. welding.
b) State function of Flux & filler Metal.
c) Write down combustion reaction / chemistry of oxy-acetylene Gas welding.
d) State only uses of oxidising & Reducing flame of O_2-C_2H_2 welding.
e) State various Metallurgical Changes happen in welding.
f) Explain advantages & application of flash welding.

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

a) Explain working of TIG.
b) Distinguish between consumable electrode practice & Non consumable electrode practice.
c) Principle of Electric Arc Generation. What is advantage of electric Arc welding.
d) State different types of Resistance welding . Why joint of resistance welding is pure Quality.
e) Explain working & application of thermitt welding.
f) State only source of welding heat in electron beam, explosive welding, thermitt welding & Resistance welding.

P.T.O.

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

a) State commonly used non-destruction testing methods to test weld portion.
b) State any two advantage of dye penetrant testing method.
c) State the principle used for electro-chemical Maching.
d) Write advantages of Electro discharge Maching.
e) Name the types of Modern forming processes.
f) What is 'Powder forging'.

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

a) State differences between soldering and Brazing.
b) What are the various requirement of soldering alloys.
c) What is the function of flux in soldering. State types of fluxes used and its function.
d) Explain i) Butt joint ii) T-joint
e) Explain pre-and post heat treatments done on welded joint, state its purpose.
f) With neat diagram show heat affected zone (H.A.Z) in fusion weld and explain it.

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

a) State the application & advantages of laser welding.
b) Give at least two compositions of soft solders with their specific application.
c) Why is testing of weld joints necessary before subjecting the component to the service.
d) Explain 'Rockwell Hardness test' for the weld inspection.
e) Explain the principle and working of electro discharge maching.
f) State the advantages and disadvantages of cold forging.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE504/ /MG405**
COURSE NAME :- **QUALITY MANAGEMENT**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **28 / 04 / 2016**

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

Section – I

Marks

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

a) What is mean by quality of confirmation?

b) Explain maintainability.

c) Compare quality control with quality assurance.

d) Give the types of quality audits.

e) What is mean by cost of quality?

f) Elaborate cost of quality and value of quality.

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

a) Explain elements of cost of quality.

b) Describe the economice of quality design.

c) Give the objectives of quality circle.

d) State the characteristics of quality control.

e) What is reliability index? Explain.

f) Explain the role of management and suppliers to ensure quality.

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

a) Describe the steps to achieve quality by design model.

b) Give the benefits and limitations of quality circles.

c) Explain internal and external failure cost of quality

P.T.O.

Section – II	Marks

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

a) Enlist four advantages of quality circle.

b) Explain the evolution of TQM.

c) What is 'Six sigma'?

d) Enlist four reasons to have ISO standards.

e) Explain importance of SQC.

f) Enlist four advantages of sampling plans over 100% inspection.

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

a) Explain the Deming's approach to TQM.

b) Explain the various ISO 14000 standards. And give the requirements of 14001.

c) i) Explain the concept of KAIZEN.

ii) Explain the advantages of ISO 9000 standards.

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

a) Explain the process capability and its uses. Give the formula used.

b) Describe the meaning and significance of OC curve. What is producer's risk?

c) i) In a capability study of lathe shaft dia. is 23.75 ±0.1mm. Calculate process capability.

Sample No.	1	2	3	4	5	6
Dia. (mm)	23.76	23.77	23.77	23.78	23.75	23.78

ii) Discuss any four quality management principles underline the ISO 9000:2000 standard.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **CCE103/X103/X109/R105/R106** COURSE NAME: **ENGINEERING CHEMISTRY**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **28/04/2016**

Instruction:-

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

Marks

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

a) Why inert gases are monoatomic in nature?

b) Write the orbital electronic configuration of ${}_7N^{14}$, ${}_{16}S^{32}$

c) Define i) Degree of ionization ii) Electro refining.

d) Define corrosion mention two types of corrosion.

e) Distinguish between hard water & soft water (any two points)

f) Define p^H. What is the p^H of extremely acidic & extremely alkaline solution?

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

a) Give the four assumptions of Bohr's Atomic theory.

b) Distinguish between electrovalent & covalent compound.

c) Describe the process of silver plating on iron spoon.

d) State and explain the type of impurities present in natural water. Name the process for the removal of these impurities.

e) Explain the disadvantages of hard water in cooking & washing use.

f) State & explain four causes of scale formation in boiler.

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

a) When same amount of current was passed through the solution of copper sulphate & zinc sulphate 0.7gm & 0.7164gm of copper & zinc get deposited on cathodes. If atomic weight of copper is 63.5. Calculated equivalent weight of Zn.

b) Describe electrolysis of $CuSo_4$ solution by using copper electrode.

c) Name & explain the method used for coating on large & irregular shape of articles for prevention of corrosion.

d) Define atmospheric corrosion. Explain two factors affecting atmospheric corrosion.

e) Draw the diagram. Give two chemical reactions in regeneration of ion exchange process.

f) Define sterilization of water. Explain with reactions use of bleaching powder.

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

a) Name the products of blast furnace. Give the composition of one product.

b) What is flash point and fire point of a lubricant?

c) Give two properties and two uses of glass wool.

d) What is vulcanization of rubber?

e) What are composite materials? Give its types.

f) Give the chemical composition of Portland cement.

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

a) What is nonferrous alloy? Give the composition, properties and uses of a) Duralumin b) Monel metal.

b) Give the reactions in heat absorption zone of blast furnace.

c) Name and explain the lubrication used for delicate machine parts.

d) Define paint. Give the functions of paints.

e) Give the reactions of setting and Hardening of cement.

f) Give four properties and uses of rubber.

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

a) Give the difference between calcinations and Roasting process.

b) What is ferrous alloy? Give the composition, properties and uses of i) Heat resisting steel ii) Magnetic steel.

c) Define lubricant. What are the functions of lubricant?

d) Name the drying oil and thinner added in paint. Give its functions.

e) What is thermocole? Give the properties and uses of thermocole.

f) What us addition polymerisation? Explain with examples.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE412**

COURSE NAME :- **ENVIRONMENTAL PROTECTION IN METALLURGICAL**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **27 / 04 / 2016**

Instruction :-

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

Section – I

Marks

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

a) Define Green House Effect and Name any four gases responsible for GH effect.

b) Degfine 'Ecosystem' and write its types.

c) Enlist the sources of 'Dust in foundries.

d) Write names of harmful substances evolved from drying molds and cores.

e) What are the process waste gases evolved in rolling mills?

f) Write about sources of noise pollution.

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

a) Explain Acid Rain Formation.

b) Explain process and non process gases evolved from Hot Rolling Mill.

c) Write about Air pollution in pipe welding and sheet rolling plants.

d) Write about air pollutants evolved from steel foundry.

e) Write characteristics of harmful waste gases and dust evolved from steel foundry.

f) Explain any two environment and pollution control acts.

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

a) Explain Prevention and control of Noise pollution.

b) Write recommendations for reducing air pollution from foundries.

c) Write about sources, and recommendation of reducing air pollution from rolling mills.

P.T.O.

Section – II	Marks

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

a) Define EIA.

b) What is 'sludge disposal'?

c) Write about hazardous waste.

d) What is mean by thermal pollution?

e) Define 'environmental audit'

f) Define 'radiation pollution'.

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

a) Explain activated sludge treatment.

b) Explain methods of disposal of hazardous waste.

c) Explain primary and secondary treatment on waste water.

d) Explain radio active waste in detail.

e) What are the methods of solid waste disposal?

f) What are the sources of thermal pollution?

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

a) Explain environmental impact assement in brief.

b) Write a short note on 'Hazardous waste landfill'

c) Write a short note on Preliminary Treatment.

d) What is mean by sludge disposal?

e) What are the techniques used in solid waste management?

f) Explain the causes of thermal pollution.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE402**

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

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **27 / 04 / 2016**

Instruction :-

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

Section – I

Marks

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

a) What is retained austenite?

b) What is secondary hardening?

c) Define the hardenability.

d) Distinguish Rimmed Steel & Killed Steel.

e) Write the purpose of annealing.

f) What is critical cooling rate?

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

a) With a neat sketch, explain the mechanism and Kinetics of pearlite to austenite transformation.

b) Enlist various types of annealing. Explain isothermal annealing.

c) Sketch any one continuous heat treatment furnace and lable the diagram and explain.

d) Explain Grossman's method of determination of hardenability of steel.

e) How martensite is formed from austenite? What is the effect of factors like carbon content and cooling rate on this transformation?

f) Explain normalizing heat treatment given to steels. Draw & differentiate microsturcture of normalized and annealed steels.

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

a) Draw a neat sketch of test ring of Jominy end quench test. Give all diamentions and all the numericals to explain.

b) What is grain size of steel? How it is measured? In what respect the fine grain steels are superior to coarse grain steels.

c) Describe the types of tempering.

P.T.O.

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

a) What is meant by carbonitriding?

b) State the application of laser hardening.

c) List the heat treatments carried on malleable C.I.

d) What is the effect of annealing on cold worked metals?

e) Define GP zone theory

f) Write the safety rules to be taken in H.T. shop.

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

a) Draw a neat microstructure of the following

i) Carburized steel before and after ii) Austempering before and after.

b) Compare and contrast Cyaniding and Nitriding.

c) Explain the principle and process of Induction hardening of steel.

d) State the advantages of Electroytic bath hardening.

e) Explain heat treatment of gray cast iron.

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

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

a) Which heat treatments are done on Al and copper alloys? Explain it.

b) State TRUE OR FALSE and justify S.G. Iron is produced by addtion of ferromaganese into liquid cast iron.

c) Explain the principle and process of Flame hardening.

d) State the advantages of laser hardening.

e) Distinguish between carbonitriding and Plasma Nitriding.

f) Explain pack carburising heat treatment.

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EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO. | | | | | | |

LEVEL : - **FIRST** PROGRAM : **COMMON**
COURSE CODE :- **CCE110/X111/R112/0116**
COURSE NAME :- **APPLIED MECHANICS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **26 / 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) Define equilibrium and state the relation between resultant force and equilibrant force.
b) State principle of Transmissibility.
c) Define Resolution of force.
d) State graphical conditions of equilibrium for parallel force system.
e) Define angle of repose.
f) If angle of repose is 30^0, calculate coefficient of friction.

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

a) A force of 100KN makes an angle of 135^0 with the horizontal. Find its orthogonal components.
b) Calculate the total moment about point 'A' for the force system shown in fig.
c) Find resultant force of concurrent force system graphically.
d) Find support reaction of a given beam as shown in figure by analytical method.
e) A body resting on a rough horizontal plane is on the point of moving by a pull of 22N acting 30^0 inclined to horizontal. Find the weight of body and coefficient of friction.
f) A body of weight 400N is placed on plane inclined at an angle of 18^0 with the horizontal. If $\mu = 0.27$, find the value of the force to be applied parallel to the plane just to move the body up the plane.

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

a) Two point loads are acting on beam as shown in fig. The self weight of beam is 2 KN/m. Using graphical method. Find support reactions.
b) A sphere of diameter 1.2m and weighing 1800N rest against two smooth planes inclined at 60^0 and 45^0 respectively. Determine reactions offered by the planes.
c) Determine analytically, the resultant of coplanar parallel forces acting vertically upwards. 40N, 20N at 30mm, 30N of 50mm and 60N at 70mm. All distances are taken from first force towards right.

PTO

d) Four forces 20N, 15N, 30N and 25N are acting at 0^0,60^0,90^0 and 150^0 from X-axis taken in order. Find resultant by analytical method.

e) Two concurrent forces of magnitude 100N have their resultant as 100N. Calculate the angle between the forces.

f) Explain Law of frictions.

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

a) Define centriod of plain figure.
b) State or locate the centre of semicircle and semisphere.
c) State law of conservation of momentum.
d) State Newton's 1st law of motion.
e) State equation for angular motion and given meaning of each term.
f) Define power and its S.I. unit

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

a) Find the centre of gravity of an equal angle section 100 X 100 X10mm and locate on figure.

b) Find the centriod of shaded area as shown figure.

c) A body falling freely under gravity passes two points 9m aparts vertically in 0.2sec. Find from what height above the upper point did it start to fall?

d) A bullet weighing 3N leaves the barrel of a rifle with a muzzle velocity of 750m/s. If the length of parallel is 100cm. Find the impulse and impulsive force.

e) A particle is rotating at 300 RPM. If the radius of rotation is 1.5m calculate i) angular Velocity ii) Linear velocity.

f) The shaft of an electric motor rotates at 1500 rpm at a particular instant. In 8 second the speed uniformly decreases to 500 rpm. Find the angular retardation.

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

a) How many litres of water can be raised in 10 minutes to a height of 30m by means of pump of 2.5KW power and efficiency 80%?

b) Water having volume of 1500 liters is lifted to a height of 6m and is delivered at velocity of 4m/sec. What is the energy possessed by water?

c) A machine having following observation. Find the law of machine.

Load (N)	100	200	300	400	500	600
Effort (N)	10	18	25	28	33	39

d) For a lifting M/C UR=50.6. An effort of 90N lifts load of 1800N and an effort of 135N requires a load of 3150N. Determine law of M/C and Maximum efficiency of machine.

e) Define i) Mechanical Advantages ii) Velocity Ratio
iii) Efficiency iv) Reversible machine.

f) Draw the nature of graphs for a lifting machine.
i) Load Vs effort ii) Load Vs idea effort. iii) Load Vs Mechanical Advantage
iv) Load Vs effort lost in friction.

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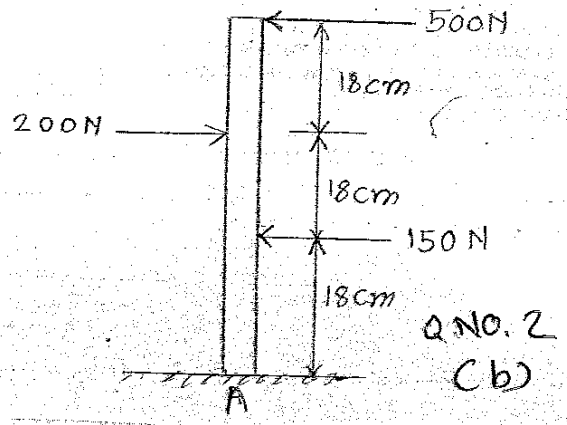

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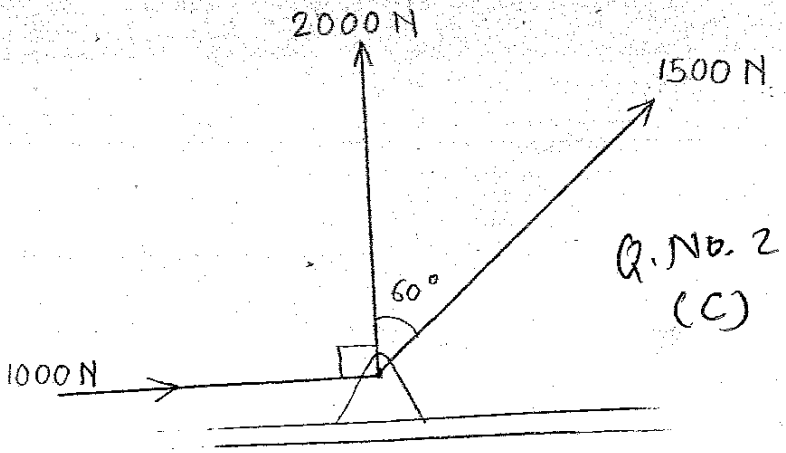
(b)



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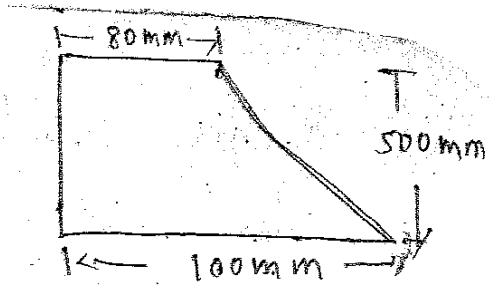

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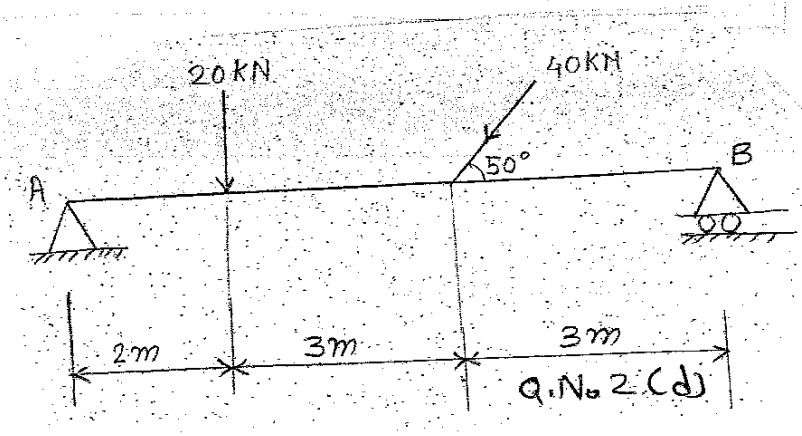

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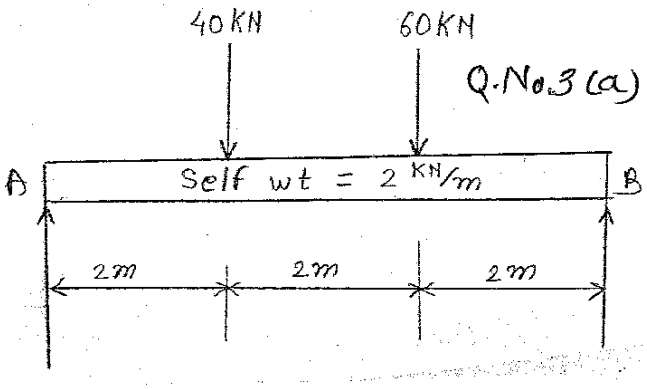

Q.No. 3 (a)

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :-**MTE505/MG210**

COURSE NAME :- **INDUSTRIAL ENGINEERING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **26 / 04 / 2016**

Instruction :-

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

Section – I Marks

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

a) Classify various types of production systems.

b) Define productivity. How it is different from production.

c) Enlist four advantages of group technology.

d) Enlist various types of assemblies.

e) What is progressive control?

f) Explain dispatching activities.

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

a) Explain various elements of cost.

b) How and why break even analysis is done?

c) Enlist four symptoms of bad plant layout.

d) Explain cellular layout.

e) Classify various material handling devices.

f) Enlist four factors considered for selection of material handling devices.

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

a) Explain i) plant capacity ii) Machine capacity iii) Plant efficiency.

b) Why operation sheet is prepared? Explain the various information stored on it. What are the advantages?

c) Attempt any two
i) Line balancing method ii) Gautt chart. iii) Routing:method and advantages.

P.T.O.

Section – II

Marks

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

a) What are the recording techniques used in method study?

b) State the objectives of work measurement.

c) Define inventory. Why inventory control is required?

d) Define a Jig and fixture.

e) What is Just In time (JIT) manufacturing?

f) What is mean by Six Sigma? Draw sketch of six sigma concept.

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

a) Explain the Man type flow process chart to writing a letter.

b) Explain the concept of ergonomics & workplace layout.

c) Explain in brief ABC analysis used for inventory control.

d) What is bin card? What information available on bin card? Sketch a general format of bin card.

e) Differentiate Jig and Fixture.

f) What is mean by Kaizen? State its benefits.

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

a) Average time of performing machining operation is 5min. Calculate std. time for the operation if the rating is 90% and the allowances are 10%.

b) What is mean by work sampling? Write down the advantages and disadvantages of work sampling.

c) What are the methods of inventory management?

d) The rate of use of an item from stores is 20units/year. The cost of placing and receiving an order is Rs.40. The cost of each unit is Rs.100. the cast of carrying inventory in percent per year is 0.16 and it depend upon the average stock. Determine EOQ. If the lead time is 3 months, calculate the reorder point.

e) What are different types of drilling jigs? Discuss any one with neat sketch.

f) What is the meaning of Poka Yoke? What are its application?

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE:**MTE307/MG207** COURSE NAME: **ELECTRICAL ENGG & ELECTRONICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **25/04/2016**

Instruction:-

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

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

a) State Fleming's Left hand Rule.
b) State how ammeter & Voltmeter are connected in a circuit.
c) What is the importance of power factor?
d) Give any two application of Electric heating.
e) State types of Electric welding.
f) Define Earthing.

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

a) State and Explain faradays laws of Electromagnetic induction.
b) Explain construction & working of dynamometer type instruments.
c) Explain construction & working of Induction type energy Meter.
d) State advantages of Electric heating.
e) Explain working principle of eddy current heating.
f) With the help of neat sketch explain working of Arc welding.

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

a) State the Necessity of earthing & a types of earthing.
b) Derive the expression for the equivalent Résistance if the resistancs are connected in series.
c) State disadvantages of low Power factor.
d) Explain construction & working of Induction furnace.
e) Explain construction & working principle of PMMC instruments.
f) Explain construction & working of moving Iron instruments.

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

a) Define the terms i) Intrinsic semiconductor ii) Extrinsic semiconductor.
b) List the types of measuring instruments.
c) What do you mean by transducers? Give its types.
d) Draw symbol for UJT and FET.
e) Convert $(1101)_2$ into hexadecimal.
f) Draw symbol and truth table for AND- gate

P.T.O.

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

a) Perform subtraction of following
   i) 11011 – 00111 ii) 00101-01011
b) Explain the concept of p- type and N-type extrinsic semiconductor with example.
c) Draw and explain digital frequecy meter.
d) State any four advantages of transducers.
e) Explain digital multimeter with neat block diagram.
f) With neat diagram explain any one type of pressure transducer.

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

a) Draw symbol and truth table for following gates.
   i)X-OR gate ii) OR-gate
b) State the principle of operation of thermistor. Mention advantages of thermistor.
c) Explain the criteria for selection of transducer.
d) Draw and explain the digital ammeter.
e) Explain any four advantages of using electronic measuring instruments.
f) What is difference between analog and digital measuring instruments? Also give examples of each

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE406/MG306**
COURSE NAME :- **POWDER METALLURGY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **04 / 05 / 2016**

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

Section – I

Marks

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

a) Define term powder metallurgy'.

b) State / Write two important the advantages of powder metallurgy.

c) List the processes used for producing metal powders.

d) What methods will you recommend for obtaining the most suitable form of powder from copper and iron (Fe)

e) Why is particle size has great importnce in powder metallurgy?

f) Define apparent density.

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

a) Compare and contrast powder metallurgy techniques with other conventional technology of fabrication of metals, alloys and finished articles.

b) How are the surface area and the surface energy of powder is measured?

c) What is meant by size distribution of metal powders?

d) Explain 'Atomization Method' for powder production.

e) Explain 'condensation method' for powder production. State is advantages.

f) Explain with the help of a flow sheet diagram the technology of production of iron powders by a process of 'reduction method'.

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

a) During the electrolytic process of metal powder production. What are the effects of current density and metal ion concentration on the nature of deposition?

b) Explain the various methods used for the determination of particle size and particle distribution of metal powders.

c) Describe briefly compression ratio and flow rate of metal powders.

P.T.O.

Section – II	Marks

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

a) Why protective atmospheres are necessary during sintering?

b) What is a powder compact?

c) What is Powder Rolling?

d) State various presses used for powder compaction.

e) What is impregnation?

f) What are cemented carbides?

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

a) Explain powder extrusion in brief.

b) Distinguish between cold and hot compaction method.

c) Explain the ISO-static compaction.

d) Explain manufacturing of cemented, carbide by powder metallugry.

e) Describe single end die and double end die compaction.

f) Which are different types of sintering mechanisms? Explain any one.

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

a) Explain sintering furnace with different zones.

b) Explain infiltration with advantages and disadvantages.

c) Describe the cemented carbides and cerments.

d) Explain explosive forming powder metallurgy.

e) Describe powder rolling process and explain its limitations for the production of strips.

f) Self lubricating bearings are manufactured, by only powder metallurgy. Why?

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MTE503/MG402**

COURSE NAME :- **INDUSTRIAL ORGANIZATION & MANAGEMENT**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **06 / 05 / 2016**

Instruction :-

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

Section – I Marks

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

a) Define management and its scope.

b) Enlist various types of leaderships.

c) Give four advantages of departmentalization.

d) What is partnership deed?

e) Give four disadvantages of co-operative organizations.

f) What are the various decision making conditions?

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

a) Enlist eight managerial competencies and describe them.

b) Give various levels of management and explain role of each.

c) Explain any four functions management.

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

a) Explain the decision support system with suitable example.

b) Classify various types of decisions and explain each with one example.

c) Enlist any four Government undertakings. What are the advantages and limitations of Government undertakings?

P.T.O.

Section – II	Marks

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

a) Define i) Node ii) Activity.

b) Enlist advantages of CPM.

c) Give long form of BPR and ERP.

d) List various linear programming techniques.

e) What is E.O.Q.?

f) Enlist four principles of material handling.

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

a) Describe ABC analysis. Enlist its advantages.

b) Give format for MPS. Describe it.

c) Describe various steps in MRP.

d) Discuss the role of financial institutions.

e) Define under and over capitalisation.

f) List sources of finance and describe them.

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

a) Prepare accident reporting quoting appropriate example.

b) Discuss about safety codes and safety training.

c) Enlist provisions under factory act.

d) Discuss workers participation in management.

e) Describe various time estimates used in PERT.

f) Enlist advantages of ERP.

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **SECOND** PROGRAM : **COMMON**
COURSE CODE :- **CCE202/0101/0102**
COURSE NAME :- **COMMUNICATION SKILL**
MAX. MARKS : **40** TIME : **2 HRS.** DATE :- **06 / 05 / 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** (Answer the following questions in 3-5 sentences) (08)

a) Draw a well labelled diagam illustrating the process of communication.

b) Enlist any four examples in which written communication is used.

c) Enlist four advantages of oral communication.

d) Explain two principles of effective written communication.

e) Define Haptics.

f) Enlist any four advantages of OHP.

Q.2 Attempt any **FOUR** (Answer the following question in 12-14 sentences) (16)

a) State i) Mechanical Barrier ii) Organizational Barriers.

b) Explain with sutiable example i)Upward communication.ii)Horizontal communication.

c) Enlist four tips for prepared speech.

d) State any four precautions one should take when making a presentation.

e) State and explain any four interview techniques.

f) State the guidelines on preparing presentation i) Thinking about audience ii) Good slide show design.

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

a) Explain types of communication. i) Verbal- Non-verbal ii) Oral – Written.

b) Following is the opinion of 100 parents about the new pattern of board exam of students X. In this problem the data is given in %.

i) In favour of new pattern – 60 ii) Against new pattern – 30 iii) No comments -10

Prepare a pie-chart.

c) Write an application along with your resume to Modern Automobile Factory, Pune-8 for the post of Junior Engineer.

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL :- **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE308**
COURSE NAME :- **PHYSICAL METALLURGY-I**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **07 / 05 / 2016**

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

Marks

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

a) Define atomic packing factor.

b) Draw cooling curve for pure metal.

c) Enlist two applications of lever rule.

d) What is peritectoid reaction?

e) What is allotropy?

f) What are the advantages of electrolytic polishing?

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

a) Explain imperfeetions in crystals.

b) Describe the construction of binary equilibrium diagram by thermal analysis method.

c) Explain the partial solubility with equilibrium diagram.

d) How amount of carbon affects the microstructure and properties of iron?

e) Describe the principle of metallurgical microscope using ray diagram.

f) Why etching is required? Explain any one method of etching?

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

a) Explain the transformation mechanism of liquid metals into solid metals.

b) Differentiate clearly between substitutional and interstitial solid solution formation.

c) Draw Iron-Ironcarbide equilibrium diagram and explain various phases, reactions in it.

P.T.O.

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

State True or False and justify:-

a) Brass alloys do not contain tin.

b) Phosphor bronzes are made of alloys of copper and phosphors.

c) Muntz metal is able to hot-worked.

d) Aluminuim alloys are used for die casting.

e) Babbits are hard and wear resistant.

f) The properties of Al-Si alloys depend on the amount of silicon.

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

a) Enlist four properties of good bearing metal.

b) What changes are observed in microstructure after modifying Al-Si alloys.

c) Give the properties, composition and application of various brass.

d) What is the significance of calculating zinc equivalance in brasses?

e) Explain the microstructure of lead based babbit.

f) Explain the steps involved in preparation of samples for microscopic examination.

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

a) Explain the defect season cracking in brasses. How it minimize?

b) Name two etchants which are used for etching steels? Give the etchants composition.

c) Explain relation between microstructure and properties of CI with suitable example.

d) Give the composition, properties and application of any one Berylluim bronze.

e) What is the orange peel effect?

f) What is meant by modification of Al-Si Alloy? State its effects.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE403/MG303**
COURSE NAME :- **FOUNDRY TECHNOLOGY-II**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **09 / 05 / 2016**

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

Section – I

Marks

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

a) State and briefly explain meaning of the term gating ratio.
b) What is the importance of riser neck?
c) What is the importance of riser shape and size?
d) What is directional solidification?
e) Enlist different heat treatment operations carried out on castings.
f) State basic difference between gray and white C.I.

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

a) What are the objectives of gating system?
b) Explain the difference between pressurised and non pressurised gating system with the help of particular gating ratios and with applications.
c) Explain caine's equation with meaning of different terms, along with schematic graphical representation.
d) Explain inscribed circle method to find out suitable riser size.
e) Explain different fettling operations in brief along with their purpose :- Shot blasting, sand blasting, grinding chipping, cutting etc.
f) What are different types of graphite in gray cast iron? Explain in brief which type is the most desirable?

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

a) What is the meaning of choke area? How does this control the actual pouring time?
b) How (in what way) sprue height affects the pouring time? How pouring weight changes the desired pouring time?
c) How exothermic materials help improve yield of castings? Enlist steps in risering.
d) Explain the process of annealing/normalising cast iron castings. When it is required to be done?
e) What are the main differences between Gray Cast Iron, and S.G. iron in structure and properties?
f) Explain the effect of carbon, silicon and manganese on graphitising tendency of cast iron.

P.T.O.

Section – II	Marks

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

a) Which element responsible to turn flake Graphite into S.G. iron nodule.

b) Write properties of steel castings.

c) List the various method of Mg-treatment on S.G. iron production.

d) Draw a Microstructure of S.G. iron.

e) What is mean by fading?

f) State the effect of Mn on properties of steel as alloying element.

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

a) List various raw material use for S.G. iron production. Explain convertor method of S.G. iron making.

b) Write down castign properties of steel.

c) State the effect of Si and 'P' on steel castings.

d) Write down properties of aluminium castings.

e) Explain Grain refinement of Al-Si Alloy. What is result due to Grain refinement?

f) Why degassing necessary for Al-melt? State any one method used in degassing.

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

a) What is fluxing and flashing with the respect to Al-melt treatment?

b) Write down two properties and uses of copper castings.

c) What are difficulties observe in copper melt production?

d) Write down properties of magnesium castings.

e) Why Mg-casting (Melt) preparation is difficult?

f) State two properties and corresponding application of Zinc castings.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MG310**

COURSE NAME :- **FOUNDRY TECHNOLOGY-III**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **09 / 05 / 2016**

Instruction :-

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

Section – I

Marks

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

a) How blow holes are produced in casting?

b) List any four inspection and testing methods.

c) Which are the sand reclamation techniques?

d) What are the factors to be considered for designing a good casting?

e) Explain the remedy for mismatch defect.

f) List any four CAD system for designing a casting.

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

a) Write cause and remedies for 'Drop and crack' casting defect.

b) Which are the design considerations for sand mould casting?

c) Explain the hot box process.

d) What do you mean by innoculant? Explain grain and constituent refinement.

e) How defects are identified by visual inspection?

f) What are the advantages of sand reclamation?

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

a) What are the causes of 'Misrun and cold shot' defects? How to overcome them?

b) Explain economics of the casting.

c) How sampling inspection helps in quality control of casting.

d) Explain dry reclamation technique.

e) Give metallurgical considerations for casting design.

f) Describe in details the defect that generally occur in castings due to moudling causes.

P.T.O.

Section – II

Marks

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

a) State various areas of mechanization in foundries.

b) What is the need for layout in foundry?

c) What is the high pressure moulding line?

d) What is Jobbing foundry?

e) Write any two means of saving energy in running cupola.

f) Write any two applications of CAD/CAM in foundries.

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

a) Explain internet based engineering for foundries.

b) Explain press pour technique.

c) Write the steps in planning good layout for foundry.

d) Comment on development of Indian foundry industry in global scenario.

e) Explain in brief i) Casting design and simulation ii) Modernization of foundry.

f) Explain Dissamatic Moulding Process.

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

a) Draw a layout of medium scale foundry. Write advantages of good layout.

b) Explain in brief

i) Intelligent advisory system for foundries. ii) Machines used for sand blasting.

c) Explain sand plant used for green sand preparation and conditioning.

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE306/MG205**
COURSE NAME :- **FOUNDRY TECHNOLOGY-I**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **10 / 05 / 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-progtammable 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 four advantages of casting process.

b) Define the binder and what is purpose of adding it in moulding sand?

c) What properties are checked during inprocess moulding?

d) State the advantages of metallic pattern.

e) State materials used for pattern making.

f) Define the investment casting.

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

a) Explain the stages in the foundry.

b) Describe pit molding and floor moulding.

c) Explain green sand moulding.

d) What are the advantages of shell moulding?

e) Explain the additives with advantages in molding sand.

f) What are the color codes used for different parts of pattern and core boxes?

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

a) Explain the shell moulding process with advantages.

b) What are pattern allowances? Explain any two allowances.

c) Explain i) Dry sand moulding ii) Loam sand moulding.

P.T.O.

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

a) Write the types of cupola furnace.

b) Write suitable moulding process for manufacturing piston rings and justify.

c) Write suitable moulding process for manufacturing precision nozzles and justify.

d) What is floor moulding?

e) What is the principle of Induction furnace?

f) What is continuous casting?

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

a) What is the principle of centrifugal casting process? Write its advantages and disadvantages. What are types of centrifugal casting process?

b) Explain with a neat sketch Direct Arc furnace. Describe its working and lining used.

c) Explain in brief i) Stack Moulding ii) 2-part No bake.

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

a) Draw a neat sketch of cupola furnace and explain its working.

b) Differentiate between gravity die casting and high pressure die casting.

c) Explain in brief i) Ceramic moulding ii) Charge calculation in cupola.

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE305/MG205**
COURSE NAME :- **EXTRACTION OF NON FERROUS METALLURGY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **11 / 05 / 2016**

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

Marks

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

a) Define 'ore dressing'.

b) State the different method of ore dressing.

c) State two deposite of copper ore with chemical formulae.

d) Define term 'Matte'.

e) Write principle of pyrometallurgical Extraction.

f) Define term roasting.

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

a) Explain Electrolytic refining of copper.

b) Describe hydrometallurgy method of copper.

c) Explain and draw Electrolytic Cell of Al-extraction.

d) Distingwish between Hydrometallurgical Method and Electro Metallurgical method.

e) Explain Blister formation stage in copper.

f) Explain WORCRA Process for continious copper production.

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

a) Describe Hall-Heroult process. Draw a flow sheet for cryolite synthesis.

b) Describe pyrometallurgical extraction of copper with flow sheet.

c) Describe Bayer process of Al-extraction.

P.T.O.

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

a) Write the properties of lead.

b) Name the important ores of lead.

c) State the uses of zinc.

d) Draw the flowsheet for the extraction of zinc.

e) State the properties of uranimum.

f) List various important ores of Thorium for extraction.

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

a) How preparation of ore is done for lead extraction?

b) Explain the refining of base bullion for lead.

c) Why the roasting of zinc ores is done?

d) State the current status of production of zinc in India.

e) Explain recovery of uranimum from their minerals with flow sheets.

f) State the important properties and uses of thorimum.

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

a) Explain pyrometallurgical extraction of lead with flowsheet.

b) State the uses of lead.

c) State the advantages and disadvantages of pyrometallurgy extraction of lead.

d) Explain zinc refining method.

e) Explain Liquation and Remelting for zinc.

f) Write a short note on 'Zinc Industries in India'.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE508/MG407**
COURSE NAME :- **ADVANCE PHYSICAL METALLURGY**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **18 / 04 / 2016**

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

Section – I

Marks

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

a) Write the principle of electron microscope.

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

c) What is the effect of alloying elements on the eutectoid composition?

d) What is magnetic field intensity?

e) What is machinability?

f) Define Wear Resistance.

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

a) Explain rotating crystal method of diffraction.

b) Explain effect of Cr & Ni on the T.T.T. diagram.

c) How the machinability of various metals & alloys is determined?

d) Explain Micro alloyed steel.

e) Explain wear due to particle impact on the materials.

f) Suggest suitable metal or alloy used in making transformer. Justify your selection.

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

a) Explain Bragg's Law of X-ray diffraction. What are the applications of diffraction?

b) Explain the wear caused by fluids flowing in the pipelines.

c) Describe construction and marking of electron microscope.

d) What is TTT diagram? Explain the factors affecting TTT diagram.

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

f) Differentiate between hard and soft magnets.

P.T.O.

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

a) Write the chemical composition of Invar & Elinvar.

b) What is austenitic stainless steel?

c) Define creep.

d) What is physical vapour deposition?

e) Write Ficks first law.

f) Write the applications of 18-8 steel.

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

a) Explain solution treatment.

b) What is the high temp on the metals and alloys?

c) Write the classification of heat resistant material.

d) Describe growth of oxide layer by diffusion.

e) What is sensitization in 18-8 stainless steel?

f) Explain heat treatment of gears.

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

a) Explain chemical vapour deposition (CVD).

b) Write chemical composition, properties and applications of high speed steel.

c) Explain the variables that influence diffusion.

d) Explain in brief (any three)

i) Inconel ii) Haste alloy iii) Super alloys.

e) Carbide precipitation in 18-8 stainless steel.

f) Explain hot die and cold die steel.

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIRST** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE302/MG203**
COURSE NAME :- **MATERIAL TESTING**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **20 / 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) Define the term elasticity and plasticity.

b) State the Hooke's Law.

c) What is elongation and Reduction of area?

d) Increase in carbon content of steel increases the ductility.
(State- false or true and justify)

e) Define toughness and ductility.

f) Suggest suitable hardness test method for
i) Grey Cast Iron ii) Ball Bearing iii) Crank Shaft.

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

a) Explain the Poldi Hardness Test.

b) Why the hardness of material is of interest to each of the following
i) Machinist ii) Design Engineer iii) the mineralogist.

c) Differentiate between stress-strain curve and true stress-strain curve.

d) Explain the Universal Test method for Tensile strength for cast iron.

e) What are the advantages of Rockwell Hardness test?

f) Draw a schematic graph showing the behavior in stress, strain curves for elastic crystalline and non-crystalline material.

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

a) Explain Hooke's law and Poisson's Ratio.

b) Describe the compression test with details.

c) Explain the i) shore Scleroscope Hardness test with advantages ii) Durometers.

P.T.O.

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

a) State the principle of eddy current test.

b) State importance of impact test.

c) Define term 'creep'

d) Explain rupture test.

e) Suggest the test to measure the fracture toughness.

f) State as to why the surface conditions are important for fatigue life.

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

a) Describe the possible nature of fatigue loading.

b) What is endurance limit? Explain it with S-N curve.

c) Give the parameters affecting creep strength.

d) Explain the procedure of charpy impact test.

e) Describe magnetic particle test with its merits and demerits.

f) Write a short note on "Visual Examination".

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

a) Describe Ultrasonic test. Give its advantages and disadvantages.

b) Which surface treatments are preferred to improve fatigue strength and why?

c) Distinguish between destructive and non-destructive tests.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **METALLURGY**
COURSE CODE :- **MTE303/MG204**
COURSE NAME :- **METALLUGRICAL ANALYSIS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **21 / 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 various method of chemical analysis. Why quantitative method superior?

b) State Name and the role of equipment used in chemical laboratory.

c) State various sources of error during chemical analysis.

d) Write steps involves in Gravimetirc analysis.

e) Define term precipitant and precipitation.

f) State objectives of filtration of precipitate.

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

a) Define term accuracy and error. State its importance in chemical analysis.

b) Explain advantages of quantitative analysis. State various areas of applications.

c) Write down use of following in chemical lab
i) Digital weigh balance ii) Pipete iii) Measuring cylinder iv) Indicators.

d) Explain term 'co-precipitation'. How is it minimized?

e) Explain various 'requirement of washing of precipitate'.

f) Define term solubility product. How it associate with precipitation?

Q.3 Write short note on (any **FOUR**) (16)

a) Sampling Method and Needs.

b) Standard solution.

c) Colorimetry.

d) Effect of solution pH on precipitate.

e) Masking.

f) Drying method of precipitate.

PTO

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

a) Define volumetric analysis.

b) Define the term titre, titrant and titration.

c) Explain standardization of solution.

d) State the principle of combustion method for carbon and sulphur.

e) What is indicator? State the types with pH range.

f) What is colorimetry and spectrometry?

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

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

b) Explain Redox-titration.

c) Describe theory of indicator.

d) Explain the procedure for volumetric analysis of managanese in iron.

e) State advantages and disadvantages of volumetric analysis.

f) Explain the procedure for combustion method for C & S analysis.

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

a) Describe emission Spectrometer.

b) Explain neutralization reaction.

c) What is principle of photo-colorimetry? Explain working of single cell photo-colorimeter.

d) Explain why weak acid is not titrated with weak base use titration curve.

e) State the advantages and disadvantages of instrumental analysis.

f) Describe electrogravimetric analysis.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: THIRD | PROGRAM: METALLURGY

COURSE CODE:MTE309/MG306 | COURSE NAME: MECHANICAL ENGG.

MAX. MARKS: 80 | TIME: 3 HRS. | DATE: 23/04/2016

Instruction:-

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

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

a) Draw conventional representation for gear.

b) State the material used for following I.C.engine parts.

i)Cylinder ii) Connecting rod

c) State the function of following I.C.engine parts.

i)Crank shaft ii) Fly wheel

d) Define conduction and convection.

e) What is insulation?

f) Define thermal conductivity and state it's unit.

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

a) Draw sectional orthographic view of pump body & flanged coupling.

b) 1. Draw conventional representation of the

i)Revolved section ii) Partial section

2. Differentiate between free convection and forced convection.

c) 1. The inner surface of brick-wall is at 42^0C and the outer surface is at 22^0C. Calculate the rate of heat transfer, if the wall is 3m x 6m in cross section. It is 250 mm thick and the thermal conductivity of the wall is 0.55 W/m K.

2. Differentiate between two stroke and four stroke engine.

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

a) Draw sectional orthographic view of

i)Camshaft ii) Engine body

b) 1. Write the detail classification of I.C.engine

2. Explain the concept of black body used in heat transfer.

c) 1. Differentiate between petrol engine and Diesel engine.

2. A steel pipe of inner and outer diameters 6 cm and 8 respectively has inside temp 150^0 C and outside temp 40^0C. The thermal conductivity of steel is 24 W/m K. Calculate the rate of heat transfer through this pipe if length of the pipe is 1.5m.

P.T.O.

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

a) Define i) Specific weight ii) Specific Volume

b) Define surface tension.

c) Write any two applications of rope drives.

d) What is the function of pump?

e) Give the classification of compressors.

f) How the fluid pressure is controlled?

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

a) Explain the terms ; i) Viscosity ii) Vapour Pressure

b) State the advantages of gear drives over belt drives.

c) Draw a general layout of hydraulic system.

d) Describe with neat sketch FRL unit.

e) Explain the construction and working principle of centrifugal pump.

f) Differentiate between reciprocating and centrifugal pump (Any Four Points)

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

a) A simple manometer is used to measure the pressure of water flowing in a pipe line. Its right limb is open to the atmosphere and the left limb is connected to the pipe. The centre of the pipe is in level with that of the mercury in the right limb. Determine the pressure in the pipe if the difference of mercury level in the two limbs is 10 cm.

b) Recommend drives for the following applications giving reasons for the same.
i)Bicycle ii) Motor cycle iii) Flour mill iv) Compressor

c) Describe with neat sketch meter-in and meter-out circuits.

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