

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV./DEC-2018**EXAM SEAT NO.**

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LEVEL :- THIRD **PROGRAM : METALLURGY****COURSE CODE :- MTF305/MTE306****COURSE NAME :- FOUNDRY TECHNOLOGY -I****MAX. MARKS : 80** **TIME : 3 HRS.** **DATE :- 11/12/2018****Instruction :-**

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

QN	S Q N	Question Text	R/ U/ A	Co MTF 305	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Enlist different sections in foundry.	R	1	
	b)	Explain pattern.	R	2	
	c)	State any two limitations of plastic as a pattern material.	U	2	
	d)	State functions of core.	R	3	
	e)	Explain loam sand.	R	4	
	f)	State the role of clay in green sand.	R	3	
Q.2		Attempt any FOUR :			16
	a)	State limitations of foundry in manufacturing a component.	R	1	
	b)	With a neat diagram, explain the use of loose piece pattern.	U/ A	2	
	c)	Explain the colour coding scheme for pattern.	R	2	
	d)	Explain core venting with its need.	R	3	
	e)	Explain procedure of sand preparation in resin sand molding.	R	4	
	f)	Compare Green sand any Dry sand molding.	R	4	
Q.3		Attempt any TWO :			16
	a)	Differentiate between wood and metal as pattern materials with respect to their significance, advantages, limitations and applications.	U/ A	2	
	b)	Why sand testing is necessary? Describe the procedure for determination of moisture content in molding sand, by infrared heating method.	U	3	
	c)	Explain the steps in preparation of a shell mold, with neat sketches. State applications of shell molding.	U/ A	4	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) State types of die casting methods. Write the parts of dies used in die casting.	U	6	
	b) State two advantages and names of components produced using centrifugal casting process.	A	6	
	c) State two limitations of continuous castings.	R	6	
	d) Write advantages of investment casting.	A	7	
	e) State principle of cupola.	U	7	
	f) Suggest moulding process suitable for Gear box housing and motor body.	A	6	
Q.5	Attempt any FOUR :			16
	a) Explain operations and advantages of Gravity Die casting.	U	5	
	b) Suggest suitable moulding process for lathe bed. Justify your casting selection.	R	5	
	c) Explain principle and procedure of true centrifugal die casting process.	U	5	
	d) Write the procedure for charge calculations in cupola furnace.	U	5	
	e) Explain procedure of slush casting.	R	5	
	f) Describe pit and floor moulding.	U	5	
Q.6	Attempt any FOUR :			16
	a) Explain cupola in terms of i) Construction ii) Charging of cupola.	U	7	
	b) Explain with a neat sketch low pressure die casting.	R	7	
	c) Comment on ceramic moulding.	A	7	
	d) Suggest a casting processes to produce electric motor body and CI liner. Justify your selection.	A	8	
	e) Explain short blasting of casting.	R	9	
	f) Explain in brief operations used in fettling.	U	9	

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ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

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LEVEL: **THIRD**

PROGRAM: CE/ME /MT

COURSE CODE: CEF301/MEF301/1201/C201/CE201/CEE301/2201/ME201/MEE301/MT201/MG201/MTE301

COURSE NAME: APPLIED MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 03/12/2018

Instruction:-

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

7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S Q N	Question Text	R U A	CO CEF 301	Marks
Q.1		Attempt any FOUR			(08)
	a)	Define Indefinite integration.	R	1	
	b)	Show that $\int 3^x 2^x dx = \frac{6^x}{\log 6} + c$	U	1	
	c)	Show that $\int \frac{dx}{3x-2} = \frac{1}{3} \log 4$	U	1	
	d)	State integration by parts rule.	R	1	
	e)	Evaluate $\int_0^{\pi/2} \sin x \cos x dx$	A	1	
	f)	Find the area under the curve $y = x^3$ from $x=1$ to $x=3$	A	1	
Q.2		Attempt any FOUR			(16)
	a)	Evaluate $\int \frac{dx}{5-4\cos x}$	A	1	
	b)	Evaluate $\int x \sin^{-1} x dx$	A	1	
	c)	Evaluate $\int_3^5 \frac{\sqrt{8-x}}{\sqrt{x} + \sqrt{8-x}} dx$	A	1	
	d)	Evaluate $\int \frac{x+2}{\sqrt{x^2+5x+6}} dx$	A	1	
	e)	Evaluate $\int_0^{\pi/4} \log(1+\tan x) dx$	A	1	
	f)	Find the area bounded by the curve $y^2=2x$ and the line $x-y=4$	A	1	
Q.3		Attempt any FOUR			(16)
	a)	Show that $\int \frac{dx}{4\cos^2 x + 9\sin^2 x} = \frac{1}{6} \tan^{-1} \left(\frac{3\tan x}{2} \right) + c$	U	1	
	b)	Show that $\int \frac{(x-1)e^x}{x^2 \cos^2(e^x/x)} dx = \tan \left(\frac{e^x}{x} \right) + c$	U	1	
	c)	Evaluate $\int \frac{\tan x \sec^2 x}{(4+\tan x)(9+\tan x)} dx$	A	1	
	d)	Evaluate $\int_1^e \log x dx$	A	1	

P.T.O.

	e)	Find the R.M.S value, of current $I=10\sin 80\pi t$ over a complete period.	A	1																			
	f)	Find Mean value of $y = x^2 - x - 12$ between the points where it cuts the x axis.	A	1																			
Q.4		Attempt any FOUR			(08)																		
	a)	Define order and degree of a D.E.	R	2																			
	b)	State the type of the D.E. $(3x^2+6xy^2)dx + (6x^2y+4y^2)dy=0$ Justify.	R	2																			
	c)	What is the Integrating factor of a D.E. $\cos^2 x \frac{dy}{dx} + y = \tan x$	U	2																			
	d)	The C.V for a series is 40 and S.D is 8. Find the mean.	R	3																			
	e)	Two series X and Y have means 30 and 40 and S.D 10 and 15 respectively. Which series has more variability?	U	3																			
	f)	If A and B are two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{7}{12}$ find $P(A' \cap B')$	R	4																			
Q.5		Attempt any FOUR			(16)																		
	a)	Show that the solution of D.E $y \frac{dy}{dx} - \frac{4x}{3} - \frac{y^2}{3x} = 0$ is $x^2 = c(4x^2 - 2y^2)^3$	U	2																			
	b)	Solve $\frac{dy}{dx} = \frac{\sin x + x \cos x}{y(1 + 2 \log y)}$	A	2																			
	c)	Solve $(1 + e^{\frac{x}{y}})dx + e^{\frac{x}{y}}(1 - \frac{x}{y})dy = 0$	A	2																			
	d)	Solve $\frac{dy}{dx} + y \cot x = x$	A	2																			
	e)	Solve $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$	A	2																			
	f)	The mean and the S.D of 100 observations were 40 and 5.1 as calculated by a student. But he took 50 instead of 40 for one observation. Calculate correct mean and correct S.D.	U	3																			
Q.6		Attempt any FOUR			(16)																		
	a)	Show that the mean deviation from the mean for the following data is 10.54 <table><tr><td>Wight in kg</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td></tr><tr><td>No. of persons</td><td>4</td><td>6</td><td>10</td><td>18</td><td>9</td><td>3</td></tr></table>	Wight in kg	10-20	20-30	30-40	40-50	50-60	60-70	No. of persons	4	6	10	18	9	3	U	3					
Wight in kg	10-20	20-30	30-40	40-50	50-60	60-70																	
No. of persons	4	6	10	18	9	3																	
	b)	Calculate mean and S.D for the following data: <table><tr><td>C.I</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>Frequency</td><td>14</td><td>23</td><td>27</td><td>21</td><td>15</td></tr></table>	C.I	0-10	10-20	20-30	30-40	40-50	Frequency	14	23	27	21	15	A	3							
C.I	0-10	10-20	20-30	30-40	40-50																		
Frequency	14	23	27	21	15																		
	c)	Find S.D and C.V for the data given below. <table><tr><td>x_i</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>f_i</td><td>07</td><td>10</td><td>16</td><td>24</td><td>21</td><td>16</td><td>06</td></tr></table>	x_i	10	11	12	13	14	15	16	f_i	07	10	16	24	21	16	06	A	3			
x_i	10	11	12	13	14	15	16																
f_i	07	10	16	24	21	16	06																
	d)	Find S.D by using step deviations method for the following data <table><tr><td>Age groups</td><td>20-24</td><td>25-29</td><td>30-34</td><td>35-39</td><td>40-44</td><td>45-49</td><td>50-54</td><td>55-59</td></tr><tr><td>No. of deaths in Town</td><td>5</td><td>3</td><td>2</td><td>6</td><td>5</td><td>13</td><td>16</td><td>30</td></tr></table>	Age groups	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	No. of deaths in Town	5	3	2	6	5	13	16	30	A	3	
Age groups	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59															
No. of deaths in Town	5	3	2	6	5	13	16	30															
	e)	From 20 tickets marked 1 to 20, one ticket is drawn at random. Show that the probability is 9/20 if it is marked with multiple of 3 or 5.	U	4																			
	f)	A problem is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?	A	4																			

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ODD TERM END EXAM NOV/DEC -2018

EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: COMMON

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

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 15/12/2018

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
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- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S Q N	Question Text	R U A	CO CCF 110	Marks
Q.1		Attempt any FOUR			(08)
	a)	Differentiate between mass & weight.	U	1	
	b)	State the principle of transmissibility of force.	R	1	
	c)	State the Varignon's theorem of moments & its use.	R	2	
	d)	State Lami's theorem & Draw a sketch to explain it with mathematical expression.	R	2	
	e)	State graphical conditions of equilibrium of force system.	R	2	
	f)	Define coefficient of friction.	R	2	
Q.2		Attempt any FOUR			(16)
	a)	A man of mass 50 kg is standing on a roof having an inclination of 25° to the horizontal. Determine the components of his weight along the roof & normal to the roof.	A	2	
	b)	Determine the angle between two equal forces 'p' if their resultant is also equal to p.	U	2	
	c)	Six forces are acting along the lines joining toward the centre of a hexagon. Determine the equilibrant force which keep this hexagon in equilibrium. Refer fig.no.1.	A	2	
	d)	A thread of load carrying capacity 102.2N. is used to hold a sphere of weight 100N, against a smooth, wall, radius of sphere is 100 mm & length of the thread is 200 mm. But it is found that thread fails By calculation find why thread fail. Refer fig.No.3.	U	2	
	e)	ABCD is weightless rod under the action of four forces as shown in figure no.2. Calculate the resultant & locate the position of resultant with respect to point 'A'. Use graphical method.	U	3	
	f)	A body of weight 400N is placed on an inclined plane at an angle 15° to the horizontal. If the coefficient of friction is 0.14. Find the value of force to be applied parallels to the plane to just to move the body up the plane.	A	2	
Q.3		Attempt any FOUR			(16)
	a)	A concurrent force system is as shown in figure no.4. Determine resultant of the given force system & also position from horizontal axis. Use graphical method.	U	3	
	b)	A beam ABC is hinged at A & placed on roller at B. The distance between two support AB is 5m & the overhang BC is 1 m. The beam carries a u.d.l of 2 KN/m over its entire length ABC & a point load of 5 KN is acting at C. Calculate support reaction using analytical method.			
P.T.O					

c)	A simply supported beam of span 4 m is loaded with an u.d.l of 5 KN/m for 2 m from left end support & a point load of 30KN at 1 m from right end. Determine support reactions using graphical method.		
d)	A wooden block is resting on a rough inclined plane whose inclination to the horizontal plane is 10° . The push force 2 N is acting parallel to the inclined plane. The block is just moving down the plane. If coefficient of friction between block & plane is 0.32 estimate the weight of the block.	A	2
e)	A loader of weight 800 N of length 4.5 m is rest against a smooth wall & rough floor. The coefficient of friction between loader & floor is 0.33 will loader stand in 60° positions with respect to the floor.	A	2
f)	i) Explain polygon law of forces with a neat sketch ii) Calculate coefficient of friction if angle of repose is 30°	A	3
Q.4	Attempt any FOUR	A	2
a)	State the centroid of semicircle of radius R.	R	4
b)	Define centroid and center of gravity.	R	4
c)	State Newton's first law of motion.	R	5
d)	State the equation of rectilinear motion & meaning of each.	R	5
e)	Calculate angular velocity of a shaft rotating at 130 rpm.	A	5
f)	State the law of conservation of energy.	R	5
Q.5	Attempt any FOUR		()
a)	Determine the centroid of T-section with respect to bottom having flange 120 x 10 mm and web 20 x 150 mm.	A	4
b)	Locate center of gravity of frustum of solid circular cone as shown in fig. Refer fig.no.5. w.r.t to bottom.	A	4
c)	A body starts from rest with a constant acceleration of 0.5 m/s^2 after what time its velocity be 2.5 m/s & How much distance it will be travelled during this time?	A	5
d)	A body falling freely under gravity passes two points 9 m apart vertically in 0.2 sec. Find from what height above the upper point did it start to fall?	A	5
e)	The shaft of motor rotates at 1000 rpm at a particular instant in 10 sec. The speed uniformly decreases to 400 rpm. Find angular retardation.	A	5
f)	A wheel 800 mm diameter starts from rest and accelerates uniformly. After 24 sec, it attains angular velocity of 120 rad/sec. Find the angular acceleration and total angle turned trough.	A	5
Q.6	Attempt any FOUR		(16)
a)	How many litres of water can be lifted in 20 min to a height of 30 m by means of a pump of 100 KW?	A	5
b)	A bollet weighing 3 N leaves the barrel of a ripple with muzzle velocity of 1000 m/s. If the length barrel in 800 mm, Find the impulse and impulsive force.	A	5
c)	Draw the nature of following graphs for a lifting machine. i) Load vs Effort ii) Load vs Ideal effort iii) Load vs Mechanical Advantages iv) Load vs Effort lost in friction	U	6
d)	Calculate efficiency of a machine to lift a load of 1000 N, if the velocity ratio of the machine is 25 and law of machine is $p = (0.01W + 5) \text{ N}$.	A	6
e)	Calculate the effort required to lift a load of 3 KN. If the machine can lift a load of 1 KN by an effort of 56 N. and 2 KN load by an effort of 96 N.	A	6
f)	In a differential axle & wheel, the diameter of effort wheel is 400 mm and the diameter of bigger axle is 100 mm and smaller axle is 80 mm. If an effort of 50 N can lift a load of 1500 N, find velocity ratio and efficiency of the machine.	A	6

Figure No. 1

Q.2) c)

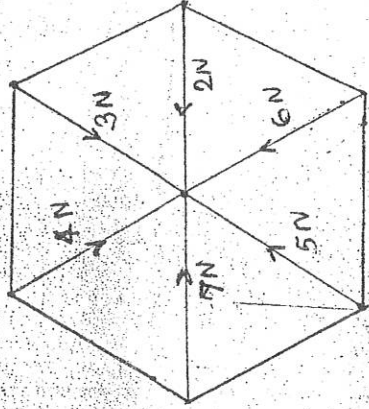


Figure No. 2

Q.2) e)

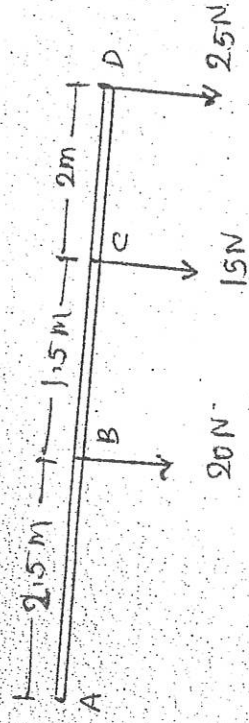
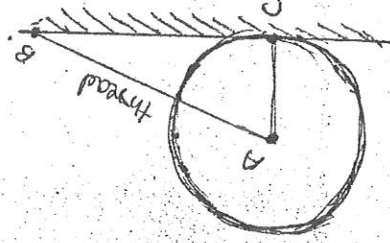


Fig No. 3

Q.2) d)

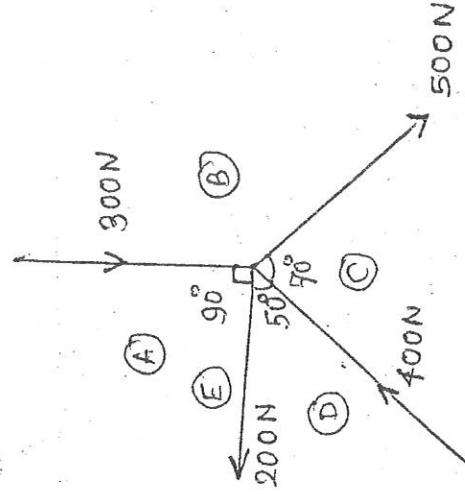


$AB = 200 \text{ mm}$

$AC = 100 \text{ mm}$

Fig No. 4

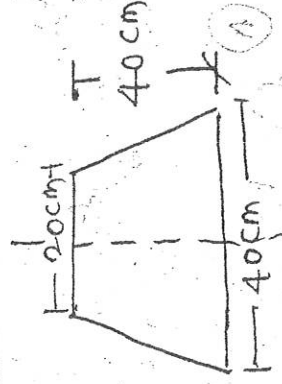
Q.3) a)



Refer Bow's notations.
given in figure.

Fig. No. 5

Q.5 (b)



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LEVEL: **THIRD**

PROGRAM: **CE/ME /MT**

COURSE CODE: **CEF301/MEF301/1201/C201/CEE301/2201/ME201/MEE301/MT201/MG201/MTE301**

COURSE NAME: **APPLIED MATHEMATICS**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **03/12/2018**

Instruction:-

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QN	S Q N	Question Text	R U A	CO CEF 301	Marks
Q.1		Attempt any FOUR			(08)
	a)	Define Indefinite integration.	R	1	
	b)	Show that $\int 3^x 2^x dx = \frac{6^x}{\log 6} + c$	U	1	
	c)	Show that $\int \frac{dx}{3x-2} = \frac{1}{3} \log 4$	U	1	
	d)	State integration by parts rule.	R	1	
	e)	Evaluate $\int_0^{\pi/2} \sin x \cos x dx$	A	1	
	f)	Find the area under the curve $y = x^3$ from $x=1$ to $x=3$	A	1	
Q.2		Attempt any FOUR			(16)
	a)	Evaluate $\int \frac{dx}{5-4\cos x}$	A	1	
	b)	Evaluate $\int x \sin^{-1} x dx$	A	1	
	c)	Evaluate $\int_3^5 \frac{\sqrt{8-x}}{\sqrt{x}+\sqrt{8-x}} dx$	A	1	
	d)	Evaluate $\int \frac{x+2}{\sqrt{x^2+5x+6}} dx$	A	1	
	e)	Evaluate $\int_0^{\pi/4} \log(1+\tan x) dx$	A	1	
	f)	Find the area bounded by the curve $y^2=2x$ and the line $x-y=4$	A	1	
Q.3		Attempt any FOUR			(16)
	a)	Show that $\int \frac{dx}{4\cos^2 x + 9\sin^2 x} = \frac{1}{6} \tan^{-1} \left(\frac{3 \tan x}{2} \right) + c$	U	1	
	b)	Show that $\int \frac{(x-1)e^x}{x^2 \cos^2(e^x/x)} dx = \tan \left(\frac{e^x}{x} \right) + c$	U	1	
	c)	Evaluate $\int \frac{\tan x \sec^2 x}{(4+\tan x)(9+\tan x)} dx$	A	1	
	d)	Evaluate $\int_1^e \log x dx$	A	1	

P.T.O.

e)	Find the R.M.S value of current $I = 10 \sin 80\pi t$ over a complete period.	A	1																		
f)	Find Mean value of $y = x^2 - x - 12$ between the points where it cuts the x axis.	A	1																		
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a)	Define order and degree of a D.E.	R	2																		
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d)	The C.V for a series is 40 and S.D is 8. Find the mean.	R	3																		
e)	Two series X and Y have means 30 and 40 and S.D 10 and 15 respectively. Which series has more variability?	U	3																		
f)	If A and B are two events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{7}{12}$ find $P(A' \cap B')$	R	4																		
Q.5																					
	Attempt any FOUR		(16)																		
a)	Show that the solution of D.E $y \frac{dy}{dx} - \frac{4x}{3} \frac{y^2}{3} = 0$ is $x^2 = c(4x^2 - 2y^2)^3$	U	2																		
b)	Solve $\frac{dy}{dx} = \frac{\sin x + x \cos x}{y(1 + 2 \log y)}$	A	2																		
c)	Solve $(1 + e^{\frac{x}{y}})dx + e^{\frac{x}{y}}(1 - \frac{x}{y})dy = 0$	A	2																		
d)	Solve $\frac{dy}{dx} + y \cot x = x$	A	2																		
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f)	The mean and the S.D of 100 observations were 40 and 5.1 as calculated by a student. But he took 50 instead of 40 for one observation. Calculate correct mean and correct S.D.	U	3																		
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a)	Show that the mean deviation from the mean for the following data is 10.54	U	3																		
	<table><tr><td>Wight in kg</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td></tr><tr><td>No. of persons</td><td>4</td><td>6</td><td>10</td><td>18</td><td>9</td><td>3</td></tr></table>	Wight in kg	10-20	20-30	30-40	40-50	50-60	60-70	No. of persons	4	6	10	18	9	3						
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No. of persons	4	6	10	18	9	3															
b)	Calculate mean and S.D for the following data:	A	3																		
	<table><tr><td>C.I</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>Frequency</td><td>14</td><td>23</td><td>27</td><td>21</td><td>15</td></tr></table>	C.I	0-10	10-20	20-30	30-40	40-50	Frequency	14	23	27	21	15								
C.I	0-10	10-20	20-30	30-40	40-50																
Frequency	14	23	27	21	15																
c)	Find S.D and C.V for the data given below.	A	3																		
	<table><tr><td>x_i</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>f_i</td><td>07</td><td>10</td><td>16</td><td>24</td><td>21</td><td>16</td><td>06</td></tr></table>	x_i	10	11	12	13	14	15	16	f_i	07	10	16	24	21	16	06				
x_i	10	11	12	13	14	15	16														
f_i	07	10	16	24	21	16	06														
d)	Find S.D by using step deviations method for the following data	A	3																		
	<table><tr><td>Age groups</td><td>20-24</td><td>25-29</td><td>30-34</td><td>35-39</td><td>40-44</td><td>45-49</td><td>50-54</td><td>55-59</td></tr><tr><td>No. of deaths in Town</td><td>5</td><td>3</td><td>2</td><td>6</td><td>5</td><td>13</td><td>16</td><td>30</td></tr></table>	Age groups	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	No. of deaths in Town	5	3	2	6	5	13	16	30		
Age groups	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59													
No. of deaths in Town	5	3	2	6	5	13	16	30													
e)	From 20 tickets marked 1 to 20, one ticket is drawn at random. Show that the probability is 9/20 if it is marked with multiple of 3 or 5.	U	4																		
f)	A problem is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?	A	4																		

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ODD TERM END EXAM NOV./DEC-2018

EXAM SEAT NO.

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

COURSE CODE :- **MTF307/MTE308**

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

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **07/12/2018**

Instruction :-

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

QN	S Q N	Question Text	R/ U/ A	Co MTF 307	Ma rks
Q.1		Attempt any FOUR : State TRUE OR FALSE and justify			08
	a)	Peritectic reaction is observed in cast Iron.	R	2	
	b)	Ferrite is solid solution of carbon in gamma iron.	R	3	
	c)	In steels all carbon is in combined form.	R	3	
	d)	Pure Iron has F.C.C. structure at room temperature.	R	1	
	e)	Etching reagents are used to reveal microstructure of metals,	R	4	
	f)	An alloy can solidify at a constant temperature.	R	1	
Q.2		Attempt any TWO :			16
	a)	Draw the Iron –Carbon diagram showing all the phases. Indicate the 3 isothermal reactions (transformations) on the diagram.	U	3	
	b)	Explain the solidification of 0.4%C and 1%C steel from austenite to room temperature with the help of microstructures.	A	3	
	c)	Draw a line diagram of Metallurgical Microscope and the ^{write} principle and working.	U	4	
Q.3		Attempt any FOUR :			16
	a)	Construct an equilibrium diagram for system showing complete solubility in liquid as well as solid state.	U	2	
	b)	Explain Lever rule with the help of diagram of isomorphism ^{draw} system.	U	1	
	c)	What are the average number of atoms per unit cell and atomic packing factor for B.C.C?	U	1	
	d)	Distinguish between eutectic and eutectoid reaction.	U	2	
	e)	Enlist the imperfections in crystals. Explain any one ⁱⁿ detail.	U	1	
	f)	What is a cooling curve? State its importance.	U	1	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) State general composition of White Cast iron.	R	5	
	b) Explain carbon Equivalent.	R	5	
	c) Explain Brasses and ^{white} its types.	R	6	
	d) Why Al-Si cast structure needs modification?	U	6	
	e) State effects of copper addition on Bearing metal.	R	6	
	f) State four properties of Bearing Metals.	R	6	
Q.5	Attempt any FOUR :			16
	a) Classify cast iron based on microstructure. Draw microstructure of white cast iron.	U	5	
	b) State purpose of Graphitization. Describe Graphitization process.	U	5	
	c) Compare white cast iron with Grey cast iron.	U	5	
	d) State factors affecting morphology of graphite. Classify Graphite flakes.	U	5	
	e) Draw Cu-Zn equilibrium diagram and label it.	U	5	
	f) State composition, properties and application of Gun metal.	U	5	
Q.6	Attempt any FOUR :			16
	a) Draw Cu-Sn equilibrium diagram. Comment on cast structure from diagram.	A	5	
	b) Draw Al-Cu alloy equilibrium diagram. Which heat treatment is given to this alloy?	A	5	
	c) Give composition, properties and applications of Duraluminium.	U	5	4
	d) Draw Al-Si equilibrium diagram. State its cast structure.	U	5	
	e) Compare lead based bearing metals with tin based bearing metals.	U	5	
	f) Classify bearing alloy. What are the requirements of bearing metals?	U	5	

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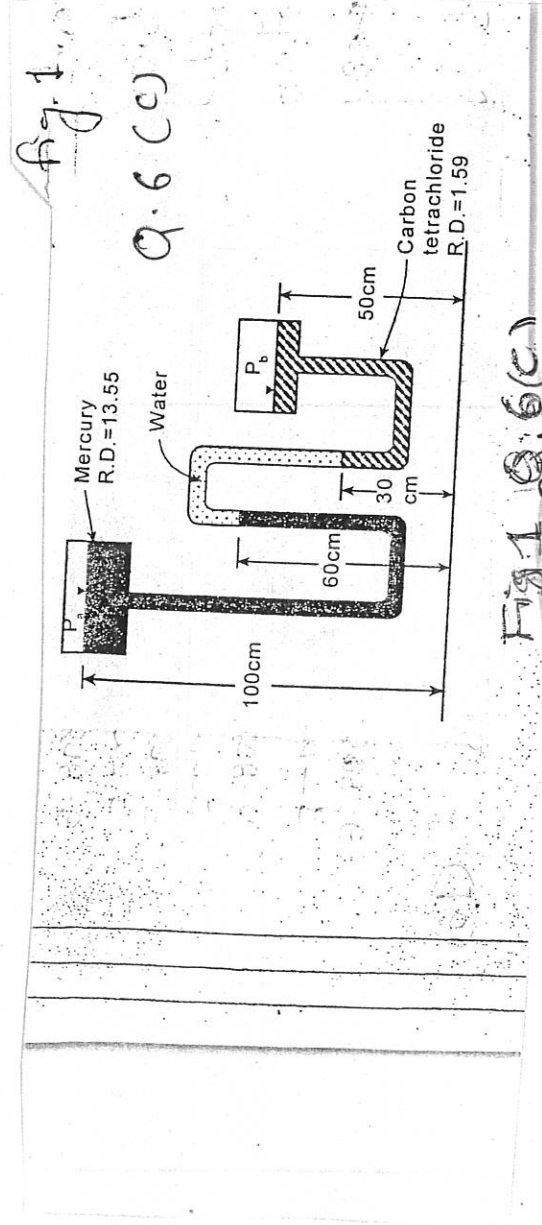
LEVEL :- THIRD**PROGRAM: METALLURGY****COURSE CODE :- MTF308/MTE309****COURSE NAME :- MECHANICAL ENGINEERING****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 05/ 12 / 2018****Instruction :-**

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

QN	S Q N	Question Text	R/ U/ A	Co MTF 308	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Draw free hand sketch for flywheel.	U	2	
	b)	Define Black body.	U	2	
	c)	Draw conventional representation of offset section.	U	2	
	d)	Write types of convection.	R	4	
	e)	Enlist different parts of I.C. Engine.	R	3	
	f)	Draw a free hand sketch for Gear.	U	2	
Q.2		Attempt any FOUR :			16
	a)	Draw free hand sectional front view of crank shaft.	U	1	
	b)	With figure, explain working of 4 stroke petrol engine.	U	3	
	c)	What is thermal conductivity? State its unit and explain it.	U	4	
	d)	Draw free hand sectional front view of flanged coupling.	U	1	
	e)	Classify Internal Combustion Engine.	R	3	
	f)	Calculate Heat transfer by conduction through thick cylinder.	R	4	
Q.3		Attempt any TWO :			16
	a)	Differentiate following. i) 2 stroke and 4 stroke engine. ii) Petrol Engine and diesel engine.	R	3	
	b)	Draw free hand sectional front view of pump body.	U	1	
	c)	A wire 1.5 mm in diameter and 150mm long is submerged in water. An electric current is passed through a wire and is increased until the water boils at 100°C. If convective heat transfer coefficient is 4500 W/m²°C. Find how much electric power must be supplied to the wire to maintain the wire surface at 120°C?	R	4	

P.T.O.

Q.4	Attempt any FOUR :		08
a)	What are the basic components of pneumatic system?	R	8
b)	State the unit for i) Sp. Weight ii) Sp. Gravity.	R	5
c)	Enlist different types of pulleys.	U	6
d)	State application of rope drive.	A	6
e)	State the practical applications of hydraulic system.	A	8
f)	Enlist the types of belt drive.	R	6
Q.5	Attempt any FOUR :		16
a)	Explain with neat sketch hydraulic power pack.	U	8
b)	Draw a labelled sketch of axial compressor.	R	7
c)	How velocity is measured with pitot tube.	U	5
d)	What is gear drive? State its applications.	A	6
e)	Draw symbol of i) 3X2 DC valve ii) Double check flow valve.	U	8
f)	State the advantages of chain drive.	R	6
Q.6	Attempt any TWO :		16
a)	Explain with neat sketch meter in and meter out circuit.	U	8
b)	Explain with neat sketch, construction and working of reciprocating pump.	R	7
c)	Determine the difference of pressure ($P_b - P_a$) for the arrangement shown Fig.1	A	5



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EXAM SEAT NO.

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LEVEL :- **THIRD**

PROGRAM : METALLURGY

COURSE CODE :- MTF301

COURSE NAME :- METALLURGICAL THERMODYNAMICS

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 20/12/2018

Instruction :-

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

QN	S Q N	Question Text	R/ U/ A	Co MTF 301	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define state and property.	R	1	
	b)	Define Isolated system with example.	R	1	
	c)	Define Entropy.	R	2	
	d)	Define thermo chemistry.	R	2	
	e)	Draw P-V diagram for Isobaric process.	U	1	
	f)	State Hess' Law.	R	2	
Q.2		Attempt any FOUR :			16
	a)	Prove that Internal Energy as a state property.	A	2	
	b)	Explain various types of thermodynamic system with examples of each.	U	1	
	c)	Scope of Metallurgical thermodynamics.	U	1	
	d)	Explain significance of Hes's Law.	U	2	
	e)	Explain Relation between Cp & Cv.	A	2	
	f)	Give the classification of thermodynamic property.	U	1	
Q.3		Attempt any TWO ,			16
	a)	Draw P-V and T-S diagram for following processes. i) Isothermal ii) Isobaric iii) Polytropic iv) Adiabatic.	U	1	
	b)	Derive mathematical relationship between Cp & Cv.	U	2	
	c)	i) Differentiate between reversible and irreversible process. ii) Differentiate between work and heat.	U U	1 2	

P.T.O.

Q.4	Attempt any FOUR :			08
	a) State second law of thermodynamics	R	3	
	b) State phase rule.	R	4	
	c) Define activity and activity coefficient.	R	4	
	d) Define Ideal solution.	R	4	
	e) State Henry's law.	R	4	
	f) What is Ellingham diagram?	R	5	
Q.5	Attempt any FOUR :			16
	a) Formulate mathematical expression for second law of thermodynamics	A	3	
	b) Explain concept of free energy.	U	3	
	c) Calculate change of free energy for the following reduction reaction at 500K. $\text{Cu O (s)} + \text{H}_2\text{(g)} = \text{Cu}_{(s)} + \text{H}_2\text{O}_{(g)}.$ Given: $\Delta H^{\circ}_{500} = -87 \text{ KJ/mol}$, $\Delta S^{\circ}_{500} = 45 \text{ J/K/mole}$	A	3	
	d) Explain free energy change as criteria for deciding nature of process.	U	3	
	e) State third Law. Give its significance.	R	4	
	f) Illustrate Zeroth law of thermodynamics.	A	4	
Q.6	Attempt any FOUR :			16
	a) Derive expression for Equilibrium constant (K) for the reaction: $aA + bB + \dots = dD + eE + \dots$ where the capital letters are general symbol for chemical elements and small letters are the number of gram atoms of each elements.	U	4	
	b) State and explain Sievert's Law.	U	4	
	c) Summarize any eight characteristics of Ellingham diagram for oxide.	U	5	
	d) Illustrate significance of Ellingham diagram for thermal dissociation of oxide.	A	5	
	e) Illustrate significance of Ellingham diagram for carbothermic reduction of oxide with the help of C-Co line on the diagram.	A	5	
	f) Explain that 'Reduction of Metal oxide by reducing agent other than carbon with the help of Ellingham diagram.	U	5	

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LEVEL :- FIRST PROGRAM : CE/ME/SM/MT**COURSE CODE :- CCF108/R110/CCE108/X107****COURSE NAME :- ENGINEERING DRAWING - II****MAX. MARKS : 80 TIME : 4 HRS. DATE :- 30/11/2018****Instruction :-**

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

QN	S Q N	Question Text	R/ U/ A	Co CCF 108	Ma rks
Q.1		Attempt any ONE :			16
	a)	Fig. I shows a pictorial view of an C.I. bracket. Draw to scale full size, the following views by using first angle method of projection. Insert important dimensions. i) An elevation in the direction of X.----- 06 marks ii) Plan and ----- 06 marks iii) End view from left ----04 marks	U	1	
	b)	Fig. II shows pictorial view of an object. Draw following views i) Front view looking in direction X ---06 marks ii) Side view in the direction Y. ----06 marks. iii) Top view. ---4 marks. Insert suitable dimensions.	U	1	
Q.2		Attempt any ONE :			16
	a)	Fig. III shows isometric view of a machine component from following views. i) Sectional front view looking in direction X. (section A-A) --08 marks ii) Sectional left hand side view (section B-B) – 08 marks	U	2	
	b)	Fig IV shows a pictorial view of an object. Draw to scale full size the following views, by using first angle method of projection. i) An elevation in the direction of arrow X .---06 marks ii) Plan and ---04 marks. iii) Sectional end view, section along A-A ---06 marks.	U	2	
Q.3		Draw proportionate free hand sketches for the following (any FOUR) i) Acme thread ii) Ring Nut. (2 views) iii) Castle Nut (2 views) iv) Lewis foundation bolt. v) Single rivetted (Double strap) butt joint. vi) Internal thread (2 views)	U	3	08

P.T.O 1/7

Q.4		Attempt any TWO :			08
	a)	Fig. 5 shows F.V. & S.V. Draw the missing view using first angle method.	U	4	
	b)	Using first angle method, draw the T.V. of an object shown in Fig.6.	U	4	
	c)	Fig.7 shows F.V. & S.V. of angle. Draw the missing view of the angle.	U	4	
Q.5		Attempt any ONE :			16
	a)	Fig. 8 shows F.V. and S.V. of an object. Draw isometric view of an object using natural scale.	A	5	
	b)	Fig. 9 shows F.V. & T.V. of an object. Draw isometric view of an object using natural scale.	A	5	
Q.6		Attempt any TWO			16
	a)	Develop the lateral surface of funnel as shown in Fig.11	A	6	
	b)	Fig. 12 shows a projections of a pentagonal prism with a partial hole as indicated. Draw the development of prism with hole in it.	A	6	
	c)	A right circular cone with base diameter 50mm and height 60mm is standing on its base on H.P. It is cut by a section plane as shown in Fig.10. Draw the development of the lateral surface 'p' of cone. Open the cone from 'O'.	A	5	

P.T.O 2/3

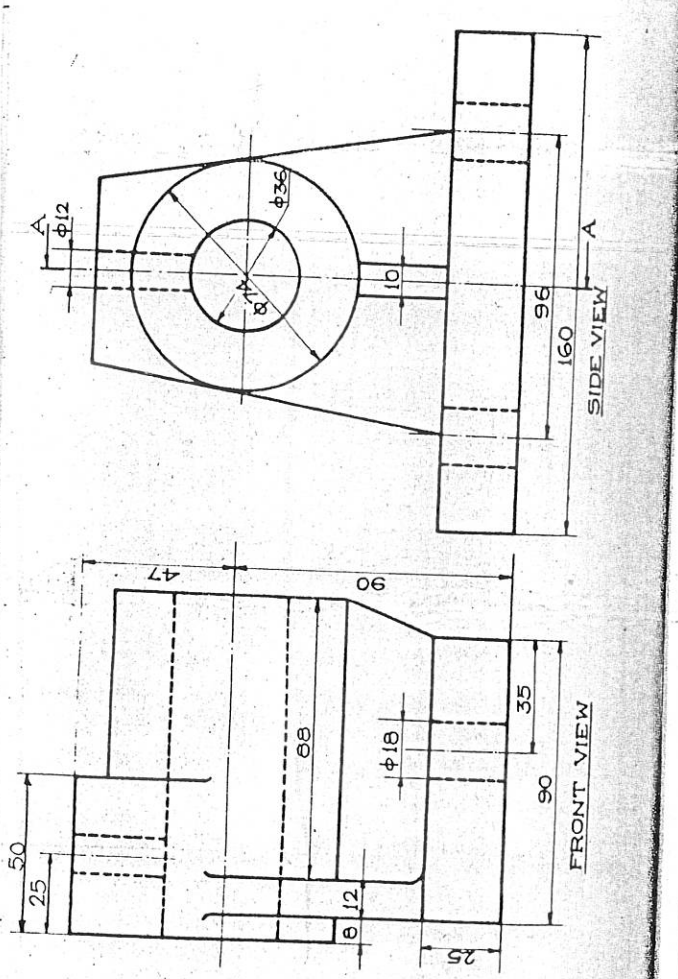


Fig. 5
Q-4 (a)

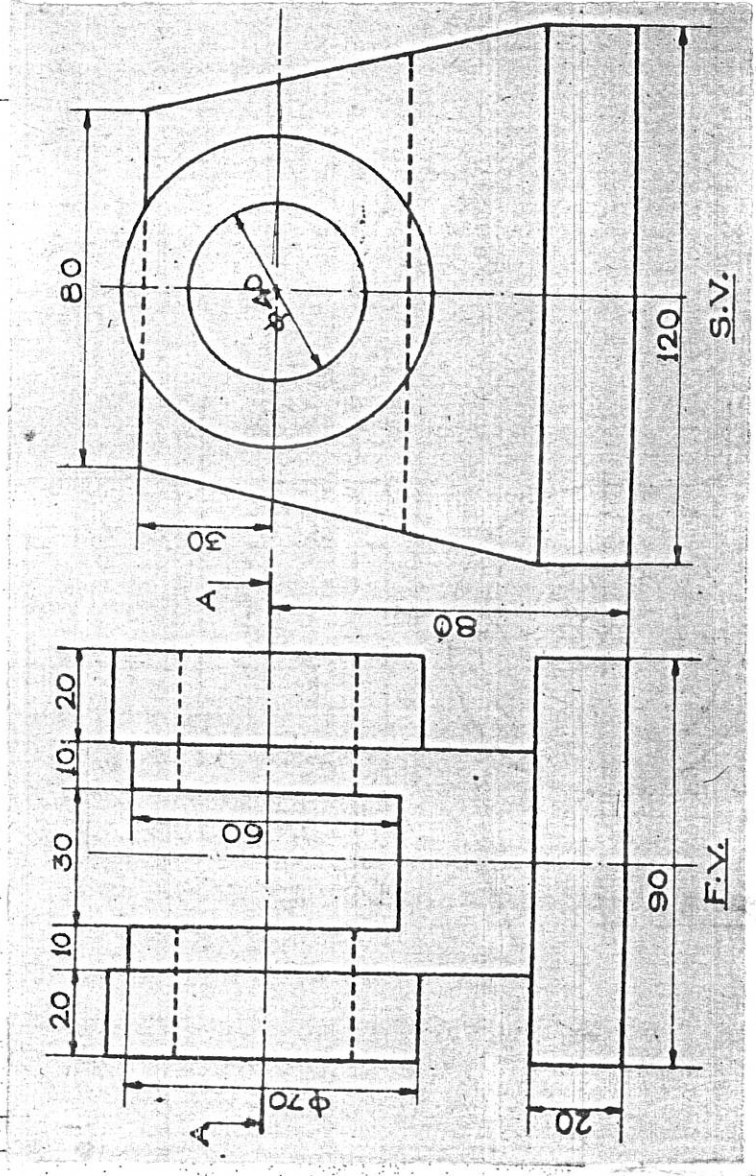
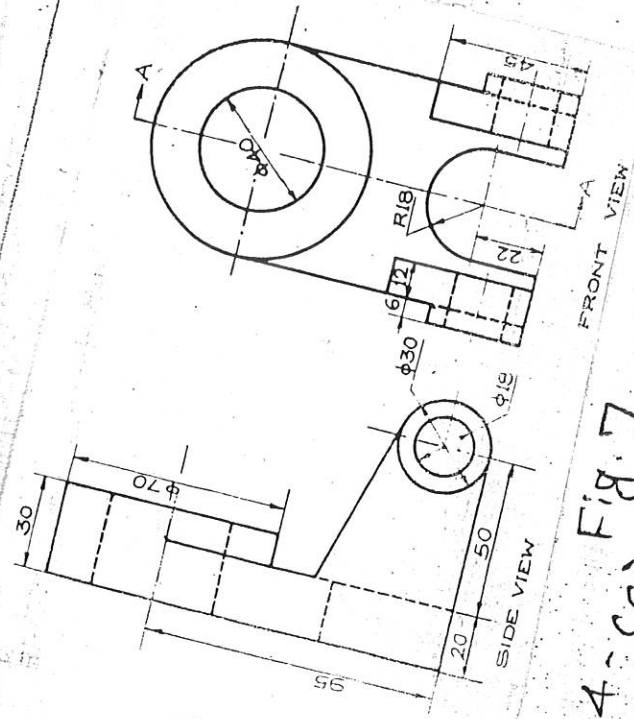


Fig. 6
Q-4 (b)

Cogni- tion Level R/U/A	CO Code	M or



Q4-(c) Fig. 7

P.T.O. 5/3

S Q N	Question text	Cogni- tion Level R/U/A	CO Code	Mark out of
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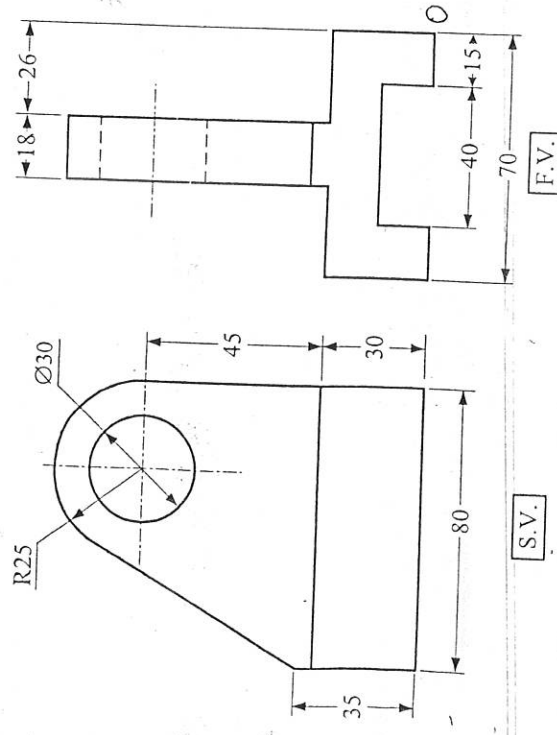


Fig 8 Q-5 (a)

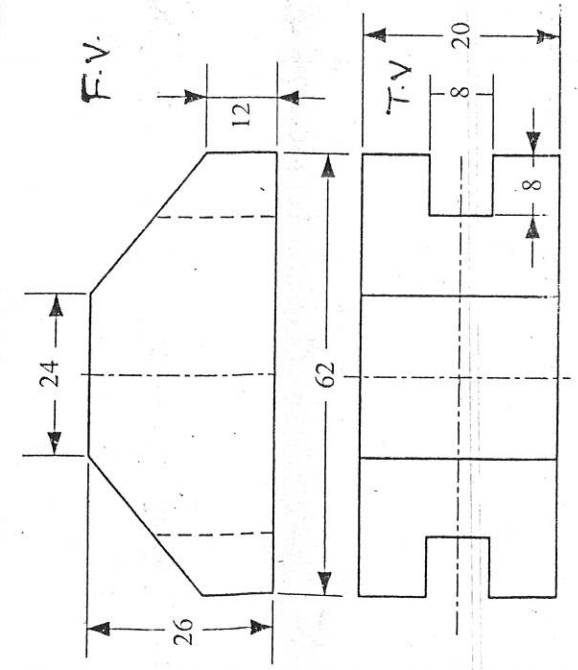


Fig-9
Q-5 (b)

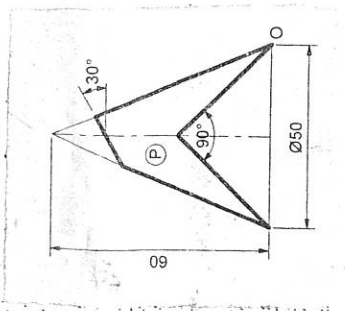


Fig 10 Q-6 (c)

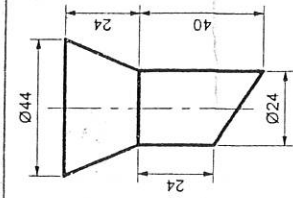


Fig-11 Q-6 (a)

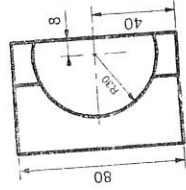


Fig-12 Q-6 (b)

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LEVEL :- FOURTH PROGRAM : METALLURGY

COURSE CODE :- MTE409

COURSE NAME FURNACE TECHNOLOGY

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 06/12/2018

Instruction :-

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

QN	S Q N	Section- I	Ma rks
Q.1		Attempt any FOUR :	08
	a)	Explain Natural Draught and Forced Draught.	
	b)	Define refractory and refractoriness.	
	c)	Name four conventional fuels.	
	d)	What are the modes of heat transfer?	
	e)	What is mean by Furnace Atmosphere?	
	f)	Define calorific value. State its unit.	
Q.2		Attempt any FOUR :	16
	a)	Describe the characteristics (properties) of ideal fuel .	
	b)	Classify refractories on the basis of composition, with one example of each.	
	c)	Compare convection and conduction as mode of heat transfer.	
	d)	Give properties of good refractory.	
	e)	Explain role of blower and burners with respect to melting furnace.	
	f)	Classify furnaces on the basis of application and fuel used.	
Q.3		Attempt any TWO :	16
	a)	Explain regenerator and recuperator, with suitable sketches.	
	b)	Explain construction and working of oil fire furnace.	
	c)	Give selection criteria factors of refractory for a particular furnace.	

P.T.O.

S Q N		Section- II	Marks
Q.4		Attempt any FOUR :	08
	a)	Enlist various materials used as heating elements in resistance furnace.	
	b)	State the principle of resistance heating.	
	c)	State role of electrode in electric arc heating.	
	d)	Write the principle of induction furnace.	
	e)	Write the advantages of crucible furnace.	
	f)	Enlist the furnaces used for ferrous and non ferrous materials.	
Q.5		Attempt any FOUR :	16
	a)	What are the advantages of direct resistance heating over indirect resistance heating?	
	b)	Explain construction of muffle furnace.	
	c)	Explain the working of indirect arc furnace.	
	d)	Comment on refractory lining used for direct arc furnace and indirect arc furnace.	
	e)	Explain working of crucible furnace in brief.	
	f)	Describe working of Reverberatory furnace.	
Q.6		Attempt any FOUR :	16
	a)	Why degassing is necessary? State various methods of degassing.	
	b)	Explain the working of vacuum induction furnace.	
	c)	Differentiate between direct and indirect resistance heating.	
	d)	Explain in brief i) Induction furnace ii) Salt bath furnace.	
	e)	Draw a neat sketch of tilting type oil fired crucible furnace and explain the procedure for melting copper alloy in it.	
	f)	Compare the application, advantages and limits of electric induction and arc furnace.	

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LEVEL: THIRD**PROGRAM: METALLURGY****COURSE CODE: MTF309/MTE101****COURSE NAME: Furnaces Refractories & Pyrometry****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 03/12/2018**

Instruction:-

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

QN	S. Q. N	Question Text	Cognition Level R/U/A	Co Code MTF 101	Marks
Q.1		Attempt any FOUR			(08)
	a)	Why refractory used as furnace construction materials.	U	1	
	b)	Enlist two names of molecular formula of Basic refractory.	A	1	
	c)	State maximum erosion of refractory happen at top of melting furnace.	R	1	
	d)	State classification of refractory. Why refractory of melting furnace posses limited porosity.	U	1	
	e)	State two uses of Refractory.	A	1	
	f)	State two uses of metallurgical furnaces.	U	2	
Q.2		Attempt any FOUR			(16)
	a)	Explain various reason of refractory failure in melting furnace.	R	1	
	b)	Explain 'PCE' test. What it determines?	A	1	
	c)	Explain working & function of control valve in furnace.	R	2	
	d)	Explain classification of furnace. Why energy consumption is important in furnace design / construction.	U	2	
	e)	Write principle & uses of Rotary furnace.	U/A	2	
	f)	Explain two advantages & uses of upola furnace.	A	2	
Q.3		Attempt any FOUR			(16)
	a)	Why direct arc furnace is more advantageous than indirect Arc furnace.	A	4	
	b)	Enlist various heatreatment furnaces. Write expectations (3 Nos.) from H.T. furnaces.	R	3	
	c)	Draw a crucible furnace. State its uses.	R	3	

P.T.O.

	d)	Explain two advantages & disadvantages of Rotary hearth furnace.	A	3	
	e)	Explain working of pit furnace.	U	3	
	f)	Explain advantage & uses of muffle furnace.	R	3	
Q.4		Attempt any FOUR			(08)
	a)	Which refractory material used in direct arc furnace ?	R	4	
	b)	Enlist temperature measurement Instruments.	R	6	
	c)	Write two disadvantage of oil fired furnace.	R	5	
	d)	Write % of carbon in steel & % in cast iron.	R	4	
	e)	Which material is used in thermometer for showing the temperature in $^{\circ}\text{C}$.	U	6	
	f)	Which charge required for direct arc furnace.?	R	4	
Q.5		Attempt any FOUR			(16)
	a)	Write advantage & disadvantage of Induction furnace.	R	4	
	b)	Explain working principle of lift out type furnace.	U	5	
	c)	Write working principle of crucible furnace used for melting of non ferrous materials.	U	5	
	d)	Write type of thermocouple & explain any one.	R	6	
	e)	Explain construction of direct arc furnace used for steel melting.	U	4	
	f)	Explain disappearing filament type optical pyrometer. (working diagram)	U	6	
Q.6		Attempt any FOUR			(16)
	a)	Temperature measurement by color.	U	6	
	b)	Total radiation pyrometer.	U	6	
	c)	Tempil pellet sortempil sticks.	U	6	
	d)	Metal expansion thermometer.	U	6	
	e)	Application of lift out type furnace.	A	5	
	f)	Medium frequency.	U	4	

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ODD TERM END EXAM NOV/DEC -2018**EXAM SEAT NO.**

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LEVEL: FIRST**PROGRAM: COMMON****COURSE CODE: CCF110/CCE110/X111/R112 COURSE NAME: APPLIED MECHANICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 15/12/2018****Instruction:-**

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

QN	S Q N	Question Text	R U A	CO CCF 110	Marks
Q.1		Attempt any FOUR			(08)
	a)	Differentiate between mass & weight.	U	1	
	b)	State the principle of transmissibility of force.	R	1	
	c)	State the Varignon's theorem of moments & its use.	R	2	
	d)	State Lami's theorem & Draw a sketch to explain it with mathematical expression.	R	2	
	e)	State graphical conditions of equilibrium of force system.	R	2	
	f)	Define coefficient of friction.	R	2	
Q.2		Attempt any FOUR			(16)
	a)	A man of mass 50 kg is standing on a roof having an inclination of 25° to the horizontal. Determine the components of his weight along the roof & normal to the roof.	A	2	
	b)	Determine the angle between two equal forces 'p' if their resultant is also equal to p.	U	2	
	c)	Six forces are acting along the lines joining toward the centre of a hexagon. Determine the equilibrant force which keep this hexagon in equilibrium. Refer fig.no.1.	A	2	
	d)	A thread of load carrying capacity 102.2N. is used to hold a sphere of weight 100N, against a smooth, wall, radius of sphere is 100 mm & length of the thread is 200 mm. But it is found that thread fails By calculation find why thread fail. Refer fig.No.3.	U	2	
	e)	ABCD is weightless rod under the action of four forces as shown in figure no.2. Calculate the resultant & locate the position of resultant with respect to point 'A'. Use graphical method.	U	3	
	f)	A body of weight 400N is placed on an inclined plane at an angle 15° to the horizontal. If the coefficient of friction is 0.14. Find the value of force to be applied parallels to the plane to just to move the body up the plane.	A	2	
Q.3		Attempt any FOUR			(16)
	a)	A concurrent force system is as shown in figure no.4. Determine resultant of the given force system & also position from horizontal axis. Use graphical method.	U	3	
	b)	A beam ABC is hinged at A & placed on roller at B. The distance between two support AB is 5m & the overhang BC is 1 m. The beam carries a u.d.l of 2 KN/m over its entire length ABC & a point load of 5 KN is acting at C. Calculate support reaction using analytical method.			
P.T.O					

c)	A simply supported beam of span 4 m is loaded with an u.d.l of 5 KN/m for 2 m from left end support & a point load of 30KN at 1 m from right end. Determine support reactions using graphical method.		
d)	A wooden block is resting on a rough inclined plane whose inclination to the horizontal plane is 10° . The push force 2 N is acting parallel to the inclined plane. The block is just moving down the plane. If coefficient of friction between block & plane is 0.32 estimate the weight of the block.	A	2
e)	A loader of weight 800 N of length 4.5 m is rest against a smooth wall & rough floor. The coefficient of friction between loader & floor is 0.33 will loader stand in 60° positions with respect to the floor.	A	2
f)	i) Explain polygon law of forces with a neat sketch ii) Calculate coefficient of friction if angle of repose is 30°	A A	3 2
Q.4	Attempt any FOUR		(08)
a)	State the centroid of semicircle of radius R.	R	4
b)	Define centroid and center of gravity.	R	4
c)	State Newton's first law of motion.	R	5
d)	State the equation of rectilinear motion & meaning of each.	R	5
e)	Calculate angular velocity of a shaft rotating at 130 rpm.	A	5
f)	State the law of conservation of energy.	R	5
Q.5	Attempt any FOUR		(16)
a)	Determine the centroid of T-section with respect to bottom having flange 120 x 10 mm and web 20 x 150 mm.	A	4
b)	Locate center of gravity of frustum of solid circular cone as shown in fig. Refer fig.no.5, w.r.t to bottom.	A	4
c)	A body starts from rest with a constant acceleration of 0.5 m/s^2 after what time its velocity be 2.5 m/s & How much distance it will be travelled during this time?	A	5
d)	A body falling freely under gravity passes two points 9 m apart vertically in 0.2 sec. Find from what height above the upper point did it start to fall?	A	5
e)	The shaft of motor rotates at 1000 rpm at a particular instant in 10 sec. The speed uniformly decreases to 400 rpm. Find angular retardation.	A	5
f)	A wheel 800 mm diameter starts from rest and accelerates uniformly. After 24 sec, it attains angular velocity of 120 rad/sec. Find the angular acceleration and total angle turned trough.	A	5
Q.6	Attempt any FOUR		(16)
a)	How many litres of water can be lifted in 20 min to a height of 30 m by means of a pump of 100 KW?	A	5
b)	A bollet weighing 3 N leaves the barrel of a ripple with muzzle velocity of 1000 m/s. If the length barrel in 800 mm, Find the impulse and impulsive force.	A	5
c)	Draw the nature of following graphs for a lifting machine. i) Load vs Effort ii) Load vs Ideal effort iii) Load vs Mechanical Advantages iv) Load vs Effort lost in friction	U	6
d)	Calculate efficiency of a machine to lift a load of 1000 N, if the velocity ratio of the machine is 25 and law of machine is $p = (0.01W + 5) \text{ N}$.	A	6
e)	Calculate the effort required to lift a load of 3 KN. If the machine can lift a load of 1 KN by an effort of 56 N. and 2 KN load by an effort of 96 N.	A	6
f)	In a differential axle & wheel, the diameter of effort wheel is 400 mm and the diameter of bigger axle is 100 mm and smaller axle is 80 mm. If an effort of 50 N can lift a load of 1500 N, find velocity ratio and efficiency of the machine.	A	6

Figure No. 1

Q.2) c)

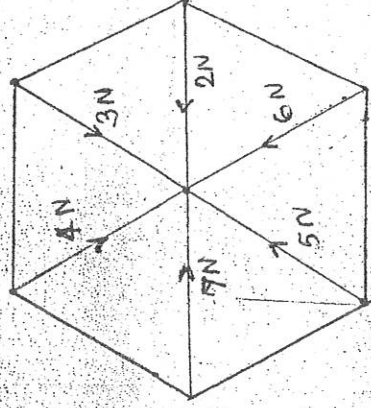


Figure No. 2

Q.2) e)

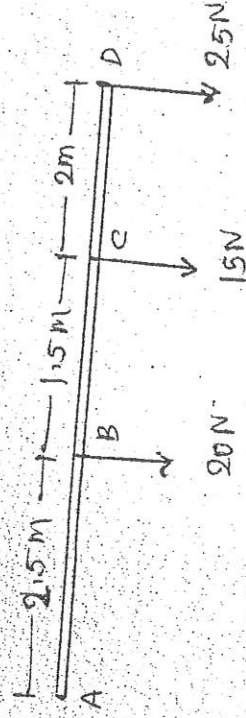
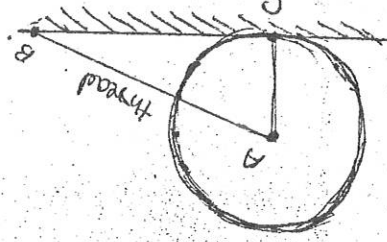


Fig No. 3

Q.2) d)

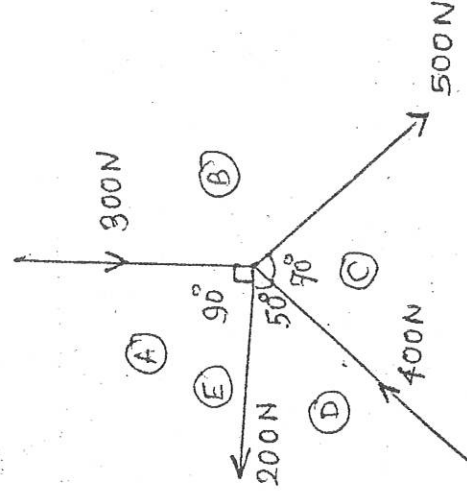


$$AB = 200 \text{ mm}$$

$$AC = 100 \text{ mm}$$

Fig No. 4

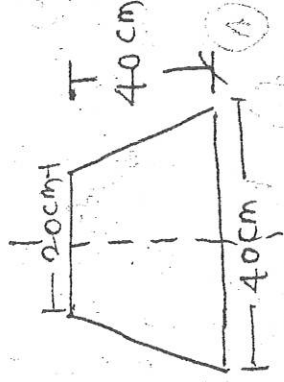
Q.8) a)



Refer Bowls notations given in figure.

Fig. No. 5

Q. 5 (b)



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EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : METALLURGY

COURSE CODE :- MTE412

COURSE NAME ENVIRONMENTAL PROTECTION IN MET. INDUSTRY

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 17/12/2018

Instruction :-

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

QN		S	Section- I	Marks
Q.1			Attempt any FOUR :	08
	a)		Define pollution and pollutant.	
	b)		Write down the general characteristics of harmful waste gases and dust.	
	c)		Explain emission points in a typical foundry.	
	d)		Discuss process gases and dust evolved in Hot Rolling Mills.	
	e)		Write a short note on measurement of noise pollution.	
	f)		What is mean by Green house effect?	
Q.2			Attempt any FOUR :	16
	a)		Write a short note on water (prevention and control of pollution) Act.	
	b)		What type of harmful substances generated in drying moulds and cores in iron foundries?	
	c)		Classify the waste generated in foundry.	
	d)		Discuss the effects of harmful substances evolved in pickling bath.	
	e)		Write down the sources and effects of noise pollution.	
	f)		Discuss effects and control measure of the acid rain.	
Q.3			Attempt any FOUR :	16
	a)		Explain pollution prevention methods for foundries.	
	b)		Write a short note on health hazards in foundries.	
	c)		Write the impacts of waste gases and dust generated in metal fire trimmed.	
	d)		Discuss Recommendation to reducing air pollution.	
	e)		Explain prevention and control of noise pollution.	
	f)		Write a short note on effects and control measure of ozone layer depletion.	

P.T.O.

QN	SQN	Section- II	Marks
Q.4		Attempt any FOUR :	08
	a)	Write about sedimentation.	
	b)	Define landfilling with diagram.	
	c)	Write about classification of solid waste.	
	d)	Define radiation pollution.	
	e)	Write sources of thermal pollution.	
	f)	Define EIA(Environmental Impact Assessment)	
Q.5		Attempt any FOUR :	16
	a)	Explain sludge treatment.	
	b)	Write about Reuse Recycling and Recovery of materials.	
	c)	Describe tertiary treatment of waste water.	
	d)	Explain phytoextraction method.	
	e)	Write sources of radiation pollution.	
	f)	Write effects of thermal pollution.	
Q.6		Attempt any TWO :	16
	a)	Explain waste water treatment.	
	b)	Describe solid waste disposal.	
	c)	Write about environmental audit.	

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ODD TERM END EXAM NOV/DEC-2018**EXAM SEAT NO.**

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LEVEL :- THIRD**PROGRAM : METALLURGY****COURSE CODE :- MTF303/MTF303****COURSE NAME :- METALLURGICAL ANALYSIS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 13/12/2018****Instruction :-**

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

QN	S Q N	Question Text	R/ U/ A	Co MTF 303	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define the term sampling of material.	R		
	b)	Define the term quantitative analysis with suitable example.	U		
	c)	Define 'error'. Enlist its types.	R		
	d)	What is solubility product? How it effect or related to precipitation condition.	A		
	e)	State purpose of drying of precipitate.	A		
	f)	Enlist steps of gravimetric analysis.	A		
Q.2		Attempt any FOUR :			16
	a)	Distinguish between quantitative analysis and qualitative analysis with respect to process, parameter and outcome product.	U		
	b)	State role of following equipment/Glassware in chemical Laboratory. i) Weighbalance ii) Filterpaper iii) Hot plate iv) Furnace.	A		
	c)	Explain the sampling of various materials.	R		
	d)	State the effect of temperature on precipitation.	R		
	e)	State various requirements of precipitate in gravimetric analysis.	R		
	f)	Explain masking with suitable example.	R		
Q.3		Attempt any FOUR :			16
	a)	What is the necessity of chemical analysis in metallurgy?	U	3	
	b)	Define term Accuracy and precision. State its significance.	A	3	
	c)	Explain the procedure to produce standard solution in laboratory from solid.	A	3	
	d)	Explain various conditions of weighed form of precipitation.	R		
	e)	Explain procedure and result of filtration of precipitation from solution.	U		
	f)	Explain the merits and demerits of gravimetric analysis.	A		

P.T.O.

Q.4	Attempt any FOUR :		08
a)	State two indicators with their pH range and colours in acid and basic.	R	3
b)	Define the term colorimeter.	U	4
c)	State the Lambert Beer's law.	U	4
d)	Define the term titration, titer and titrant.	U	3
e)	Enlist the types of titration in volumetric analysis.	A	3
f)	State the principle of vacuum emission spectrometer.	R	4
Q.5	Attempt any FOUR :		16
a)	Explain the redox titration principle.	U	3
b)	Explain the procedure of determination of chromium in iron.	A	5
c)	Explain with neat sketch photoelectric colorimeter.	R	4
d)	Draw the neat sketches of i) Strong acid and strong base titration curve. ii) Strong base and weak acid titration curve.	R	3
e)	State the advantages and disadvantages of volumetric analysis.	R	3
f)	Explain the electrogravimetric analysis.	U	4
Q.6	Attempt any FOUR :		16
a)	Explain the analytical, procedure for determination of silicon from ferrosilicon.	A	5
b)	Explain in detail strong acid and weak base titration with titration curve.	U	3
c)	Explain the requirements of volumetric analysis.	U	3
d)	Explain in detail the analysis procedure on spectrometer.	A	4
e)	Distinguish between instrumental analysis and classical analysis method.	R	4
f)	Explain in detail precipitation titration.	U	3

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

COURSE CODE **MTE505/MG210**

COURSE NAME :- **INDUSTRIAL ENGINEERING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **14/ 12 / 2018**

Instruction :-

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

QN	S Q N	Section- I	Mar ks
Q.1		Attempt any FOUR :	08
	a)	Define variable cost and give two examples of it.	
	b)	How production system is analyzed?	
	c)	Define group technology.	
	d)	Explain Line of balance.	
	e)	Define Machine capacity.	
	f)	Define dispatching and state its types.	
Q.2		Attempt any FOUR :	16
	a)	Explain the steps in routing.	
	b)	Describe the processes involved to convert raw material into finished product.	
	c)	Explain factors considered while selecting a material handling equipment.	
	d)	Explain the objectives of good plant layout.	
	e)	Describe importance of productivity calculation.	
	f)	Describe reliable assembly planning technique.	
Q.3		Attempt any TWO :	16
	a)	i) The fixed costs for the year are Rs. 80,000/-. The estimated sales are valued at Rs. 2,00,000/- If each unit sells at Rs. 20/-, determine the breakeven point ii) Explain Gantt chart.	
	b)	Explain various factors affecting site selection of plant location.	
	c)	Explain the inspection stages of product involved in process planning.	

P.T.O.

QN		Section- II		Mar ks
Q.4	S Q N			
		Attempt any FOUR :		08
	a)	Define method study.		
	b)	Explain bin card.		
	c)	Enlist various components of jig.		
	d)	Classify various types of locators used in jig.		
	e)	Define JIT manufacturing.		
Q.5	f)	Explain Brain storming.		
		Attempt any TWO :		16
	a)	What is Material requirement planning? How store is useful in it?		
	b)	Explain push and pull type manufacturing system and single prices production system.		
	c)	i) Explain flow process chart with example. ii) Enlist four general principles of jig design.		
		Attempt any TWO :		16
	a)	Classify various recording techniques used in method study. Explain spring diagram.		
Q.6	b)	i) Why allowances are added? Give types. ii) What is merit rating?		
	c)	i) Explain the concept of inventory cost relationship. ii) How EOQ is calculated?		

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EXAM SEAT NO.

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LEVEL: THIRD

COURSE CODE:

PROGRAM: CE/ME/MT/SM

MEF313/ME214/MEE313/CEE313/EIF312/IX210/IEE312/ITE312/MG228/EJ210/ETE312 /R228

COURSE NAME: HIGHER MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 27/11/2018

Instruction:-

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

QN	S Q N	Question Text	R U A	Co MEF 313	Mark s														
Q.1		Attempt any FOUR			(08)														
	a)	Find the first order partial derivatives w.r.t 'x' & 'y' of the following functions. 1) $\log(ax + by)$ 2) $(y - ax)^{3/2}$	R	2															
	b)	Prove that i) $\Delta^n = \nabla^n E^n$ ii) $(E^{1/2} + E^{-1/2})(1 + \Delta)^{1/2} = 2 + \Delta$	U	1															
	c)	Define the Jacobian of u, v & w w.r.t x, y & z	R	2															
	d)	If $u = xy$, $v = x + y$ Then prove that $\frac{\partial(u, v)}{\partial(x, y)} = y - x$	U	2															
	e)	Define the shift operator E & write the relation between E, Δ & ∇	R	1															
	f)	Write the Lagrange's interpolation formula for unequal intervals for the following data. <table><tr><td>x</td><td>x_0</td><td>x_1</td><td>x_2</td><td>x_3</td><td>x_4</td></tr><tr><td>y</td><td>y_0</td><td>y_1</td><td>y_2</td><td>y_3</td><td>y_4</td></tr></table>	x	x_0	x_1	x_2	x_3	x_4	y	y_0	y_1	y_2	y_3	y_4	R	1			
x	x_0	x_1	x_2	x_3	x_4														
y	y_0	y_1	y_2	y_3	y_4														
2		Attempt any FOUR			(16)														
	a)	Express the polynomial $f(x) = x^4 + 2x^3 - 5x^2 + 3x + 7$ in factorial notation & Hence, Show that $\Delta^4 f(x) = 24$	U	1															
	b)	Using Lagrange's interpolation formula find the value of f(9) from the following data: <table><tr><td>x</td><td>5</td><td>7</td><td>11</td><td>13</td><td>17</td></tr><tr><td>y</td><td>150</td><td>392</td><td>1452</td><td>2366</td><td>5202</td></tr></table>	x	5	7	11	13	17	y	150	392	1452	2366	5202	A	1			
x	5	7	11	13	17														
y	150	392	1452	2366	5202														
	c)	Using Newton's Backward interpolation formula, find the value of f(0.7) from the following data: <table><tr><td>x</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td></tr><tr><td>f(x)</td><td>2.68</td><td>3.04</td><td>3.38</td><td>3.68</td><td>3.96</td><td>4.21</td></tr></table>	x	0.1	0.2	0.3	0.4	0.5	0.6	f(x)	2.68	3.04	3.38	3.68	3.96	4.21	A	1	
x	0.1	0.2	0.3	0.4	0.5	0.6													
f(x)	2.68	3.04	3.38	3.68	3.96	4.21													
	d)	If $u = \log(\frac{x^3 + y^3}{x^2 - y^2})$ Then by using Euler's Theorem. Prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -1$	U	2															

P.T.O

	e)	If $u = \log(\tan x + \tan y + \tan z)$ then. Find the value of $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z}$	A	2															
	f)	If $x = v^2 + w^2$, $y = w^2 + u^2$ & $z = u^2 + v^2$ Then find J & J'	A	2															
Q.3		Attempt any FOUR			(16)														
	a)	If $x = uv$, $y = \frac{u}{v}$ prove that $JJ' = 1$	U	2															
	b)	Find the missing terms in the following table with the help of a forward difference operator. <table><tr><td>x</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3</td><td>3.5</td></tr><tr><td>y</td><td>1</td><td>3</td><td>-</td><td>5</td><td>-</td><td>10</td></tr></table>	x	1	1.5	2	2.5	3	3.5	y	1	3	-	5	-	10	A	1	
x	1	1.5	2	2.5	3	3.5													
y	1	3	-	5	-	10													
	c)	Using Newton's forward interpolation formula find the value of f(142) from the following data <table><tr><td>x</td><td>140</td><td>150</td><td>160</td><td>170</td><td>180</td></tr><tr><td>f(x)</td><td>3.685</td><td>4.854</td><td>6.302</td><td>8.076</td><td>10.225</td></tr></table>	x	140	150	160	170	180	f(x)	3.685	4.854	6.302	8.076	10.225	A	1			
x	140	150	160	170	180														
f(x)	3.685	4.854	6.302	8.076	10.225														
	d)	Show that $\Delta^2 \cos 2x = -4 \sin^2 x \cos(2x + 2h)$	U	1															
	e)	If $u = x^3 \phi(\frac{y}{x}) + y^3 \psi(\frac{x}{y})$ Then by using Euler's Theorem find the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$	A	2															
	f)	Verify Euler's Theorem for $u = \sin(\frac{x+y}{x-y})$	A	2															
Q.4		Attempt any FOUR			(08)														
	a)	Evaluate $L[e^{-t} \cdot \cos 2t]$	U	3															
	b)	Evaluate $L^{-1}\left[\frac{6}{2s-3}\right]$	R	3															
	c)	Evaluate $L[\sin^2 2t]$	R	3															
	d)	Solve : $\frac{d^2 x}{dt^2} + 5 \frac{dx}{dt} + 6x = 0$	R	4															
	e)	Solve : $\frac{d^2 y}{dx^2} - 8 \frac{dy}{dx} + 16y = 0$	U	4															
	f)	Solve : $(D^2 + 4)y = 0$	R	4															
Q.5		Attempt any FOUR			(16)														
	a)	Evaluate : $L[\sin 2t \cdot \sin 3t]$	U	3															
	b)	Evaluate : $L[t \cdot e^{-t} \cdot \sin 2t]$	A	3															
	c)	Find $L^{-1}\left[\frac{1}{s^2(s+1)}\right]$	A	3															
	d)	Solve by Laplace transform method $\frac{d^2 y}{dt^2} + y = t$ Given that $y'(0) = -2$ and $y(0) = 1$	A	3															
	e)	Solve : $\frac{d^3 y}{dx^3} - 7 \frac{d^2 y}{dx^2} + 10 \frac{dy}{dx} = 0$	U	4															
	f)	Solve : $(D^4 + 2D^2 + 1)y = 0$	A	4															
Q.6		Attempt any FOUR			(16)														
	a)	Solve : $\frac{d^3 y}{dx^3} - 3 \frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} - 2y = 0$	A	4															
	b)	Solve : $(D^3 + 3D^2 + 3D + 1)y = 0$	A	4															
	c)	Solve : $\frac{d^2 y}{dx^2} + 6y = 0$	U	4															
	d)	Apply convolution theorem to evaluate $L^{-1}\left[\frac{1}{s(s^2+4)}\right]$	A	4															
	e)	Evaluate : $L\left[\frac{1-\cos t}{t}\right]$	A	3															
	f)	Solve : $(D^3 + 1)y = 0$	U	3															

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ODD TERM END EXAM NOV./DEC-2018

EXAM SEAT NO.

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

COURSE CODE :- **MTF306**

COURSE NAME :- **ELECTRICAL AND ELECTRONICS FOR MET. ENGG.**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **29/11/2018**

Instruction :-

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

QN	S	Section-I	R/ U/ A	Co MTF 306	Mar ks
Q.1		Attempt any FOUR :			08
	a)	State Fleming's Left hand rule.	R	1	
	b)	Enlist various measuring instruments.	R	2	
	c)	Give two examples where heating effect of electric current is used.	R	3	
	d)	List the different types of wires.	R	5	
	e)	Give S.I. units of power and energy.	R	1	
	f)	State the importance of power factor.	U	3	
Q.2		Attempt any FOUR :			16
	a)	With neat diagram, explain Faraday's Laws of electromagnetic induction.	U	1	
	b)	Explain construction and working of dynamometer type instruments.	U	2	
	c)	State advantages of electric heating.	R	3	
	d)	Explain resistance welding with neat diagram.	U	4	
	e)	For using heavy electric equipments which type of safety is to be followed?	A	5	
	f)	Compare induction heating and dielectric heating (any 4 points)	U	3	
Q.3		Attempt any FOUR :			16
	a)	Derive the expression for the equivalent resistance if the resistances are connected in series.	U	1	
	b)	Draw neat diagram to show how Ammeter, Voltmeter and Wattmeter can be connected in the circuit.	U	2	
	c)	Explain the working of resistance oven.	U	3	
	d)	List the types of welding. Give typical applications of any one type.	R	4	
	e)	Explain construction and working of single phase induction type energy meter.	U	2	
	f)	Explain construction and working of induction furnace.	U	3	

P.T.O.

QN		S	Section- II		R/ U/ A	Co MTF 306	Mar ks
Q.4			Attempt any FOUR :				08
	a)		Draw symbols for following devices : i) BJT ii) UJT		R	6	
	b)		State function of transducers. Give examples of transducers.		R	8	
	c)		Convert $(FF)_H$ into decimal.		A	9	
	d)		List various types of electronic measuring instruments.		R	7	
	e)		Differentiate between analog and digital electronic measuring instrument. (any two points)		U	7	
	f)		State the advantages and disadvantages of resistance temperature detector (RTD).		R	8	
Q.5			Attempt any FOUR :				16
	a)		With the help of neat diagram explain the thermocouple as temperature transducer.		U	8	
	b)		Explain construction of any one type of junction field effect transistor with neat diagram.		U	6	
	c)		Draw and explain the operation of digital frequency meter.		U	7	
	d)		Explain the types of transducer with the help of two examples each.		U	8	
	e)		State and explain any four advantages of using electronics measuring instrument.		U	7	
	f)		Multi ply and find result i) $1010X1000$ ii) $0111 X 11110$		A	9	
Q.6			Attempt any FOUR :				16
	a)		Explain the selection criteria of choosing transducer.		U	8	
	b)		Convert the following decimal numbers into binary. i) $(20)_{10}$ ii) $(35)_{18}$		A	9	
	c)		Explain working of any one type of pressure transducer.		U	8	
	d)		With the help of diagram explain operation of PN-junction diode.		U	6	
	e)		Draw and explain the block diagram of digital multi meter.		U	7	
	f)		Explain the function of digital voltmeter with the help of diagram.		U	7	

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EXAM SEAT NO.

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LEVEL :- **THIRD**

PROGRAM : **METALLURGY**

COURSE CODE :- **MTF304/MTE304**

COURSE NAME :- **EXTRACTIVE METALLURGY**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **28/11/2018**

Instruction :-

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

QN	S Q N	Question Text	R/ U/ A	Co MTF 304	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define i) Mineral ii) Ore.	R	1	
	b)	Draw schematic diagram of 'flash roaster'	A	1	
	c)	Explain working of 'Disc pelletizer'.	U	2	
	d)	Write down functions of 'Fluxes'.	U	2	
	e)	List down advantages of 'miniblast furnace'.	U	3	
	f)	State advantages of L-D process of steel making.	R	4	
Q.2		Attempt any FOUR :			16
	a)	Draw a schematic of blast furnace showing various temperature regions.	A	4	
	b)	Explain 'various regions in blast furnace.	A	3	
	c)	Write a detailed note on fluxes with respect to following points i) Types ii) Properties iii) Functions iv) Applications.	U	2	
	d)	Explain with schematic drawing 'Drum pelletizer'.	A	2	
	e)	Explain in details 'any two regions in blast furnace'.	A	4	
	f)	Explain principle of operation and working of 'Electric Arc furnace'	A	4	
Q.3		Attempt any TWO :			16
	a)	Write a detailed note with schematic drawing of the following i) Flash roaster ii) Fluidized bed roaster.	U	1	
	b)	Explain 'Oxygen steel making process (L.D. process)' with its principle and working.	A	3	
	c)	With respect to operation of blast furnace, explain following terms i) Drying ii) Banking iii) Tapping iv) Back draughting.	U	5	

P.T.O.

Q.4	Attempt any FOUR: <i>types of</i>			08
	a) Enlist secondary steel making processes.		R	6
	b) State the principle of VAR process.		U	6
	c) State Sieverts Law.		A	7
	d) Enlist four applications of aluminium.		R	9
	e) Write down the steps of Hall-Heroult process for extraction of aluminium.		R	9
	f) Write down two ores of copper with its chemical formula.		R	10
Q.5	Attempt any FOUR :			16
	a) Describe ladle furnace with various features.	U		6
	b) State the advantages of secondary steel making process.	R		6
	c) Explain hybrid process with an example.	U		6
	d) Enlist degassing techniques.	R		7
	e) State the merits and demerits of continuous casting of steel.	U		8
	f) Draw the neat sketch of vertical type continuous casting machine.	A		8
Q.6	Attempt any FOUR:			16
	a) Draw the flowsheet of manufacturing process for carbon electrodes.	U		9
	b) Describe anode effect in electrolytic cell for aluminium electrolysis.	U		9
	c) State the factors affecting Bayer process for aluminium extraction.	R		9
	d) State the characteristics of WORCRA process.	R		10
	e) Draw the flowsheet for ferric chloride leaching of copper concentrate.	U		10
	f) Describe fire refining for extraction of copper.	U		10

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EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: MTE406

MAX. MARKS: 80

PROGRAM: METALLURGY

COURSE NAME: POWDER METALLURGY

TIME: 3 HRS.

DATE: 28/11/2018

Instruction:-

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

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Write principle of powder metallurgy.
- b) Write two disadvantages of powder metallurgy.
- c) Write four application of powder metallurgy.
- d) List four name metals materials which is mainly used in powder metallurgy.
- e) List steps used for powder metallurgy process.
- f) Define density with formula and unit of it.

Q.2 Attempt any FOUR

(16)

- a) Write scope of powder metallurgy in industry.
- b) Discuss the mechanical method of powder production.
- c) Explain chemical method of powder metallurgy.
- d) Mention & elaborate types of sampling methods.
- e) Explain reduction method of powder metallurgy
- f) Write a note on 'carbonyl method' of powder metallurgy.

Q.3 Attempt any FOUR

(16)

- a) Mention specific characteristics of powder manufactured by each method & application of various metals & alloys.
- b) Draw and Explain various sizes of powder metallurgy.
- c) Draw a well-labeled diagram of 'powder production by atomization'.
- d) Brief on 'density of metal powders'.
- e) Define surface energy of a material and discuss how it is calculated.
- f) Explain milling method of powder metallurgy.

P.T.O

Section – II

Marks
(08)

Q.4 Attempt any **FOUR**

- Define term compaction.
- Why is protective atmosphere required during sintering?
- Write advantages of liquid phase sintering.
- What are the pre-requisites of sintering furnace?
- State the characteristics of oil-impregnated porous bearings.
- Describe the different types of applications for sintered friction materials.

Q.5 Attempt any **FOUR**

(16)

- What is the importance of lubrication in powder compaction? What are various lubricants used in powder compaction.
- Enumerate the various techniques of compaction of metal powders. Describe the different pressureless forming method for making metal powder compacts.
- What are the advantages of isostatic pressing? Describe the wet and dry bag tooling methods of isostatic pressing.
- Discuss the powder rolling process and explain the various limitations of this method for the production of strips.
- What is sintering? Explain the stages of sintering.
- Explain the manufacture of cemented carbide tool.

Q.6 Attempt any **FOUR**

(16)

- Explain the term explosive forming with advantages and disadvantages.
- Sketch and explain steps involved in cold compaction.
- What are the advantages of hot pressing?
- What are the various mechanisms of sintering? Explain any two of them.
- What atmospheres are used for sintering metal parts? State the functions of sintering atmosphere.
- State what are the various requirement of bearing materials produced by powder metallurgy?

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EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: SM/MT

COURSE CODE: CCF103/X103/CCE103

COURSE NAME: CHEMISTRY OF ENGG.

MATERIALS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 28/11/2018

Instruction:-

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

QN	S. Q. N	Question Text	Cognition Level R/U/A	Co Code CCF-103	Marks
Q.1		Attempt any FOUR			(08)
	a)	Why atom is electrically neutral ?	A	1	
	b)	Define : (i) Atomic mass number, (ii) Electrovalency	R	1	
	c)	Distinguish between metallic conduction & Electrolytic conduction (any two)	U	2	
	d)	State Faraday's first law of Electrolysis.	R	2	
	e)	Name the salts present in hard water.	U	4	
	f)	Give the disadvantages of hard water when it is used in cooking purposes.	A	4	
Q.2		Attempt any FOUR			(16)
	a)	Write orbital electronic configuration of following : $_{11}\text{Na}^{23}, _{7}\text{N}^{14}, _{16}\text{S}^{32}, _{10}\text{Ne}^{20}$	A	1	
	b)	Explain mechanism of electrolysis of CuSO_4 solution by using Pt – electrode.	U	2	
	c)	Define atmospheric corrosion. Explain factors affecting atmospheric corrosion. (any three)	U	3	
	d)	Explain with neat labeled diagram metal spraying method. Write its two applications.	A	3	
	e)	Draw the neat labeled diagram of Ion exchange method. How cation exchange resin is regenerated ?	A	4	
	f)	State & explain causes of scale formation in boiler.	R	4	
Q.3		Attempt any FOUR			(16)
	a)	Describe the formation of MgO molecule with diagram & name the type of bonding.	A	1	

	b)	Explain why copper is electro-refined. Describe the process of electro refining of copper.	A	2	
	c)	Name the different types of oxide film & explain which oxide film is more protective.	U	3	
	d)	Define sterilization of water. Explain with reaction use of bleaching powder.	U	4	
	e)	Explain the disadvantages of scale formation in boiler.	R	4	
	f)	Write four chemical reactions of salts with soap in hard water.	A	4	
Q.4		Attempt any FOUR			(08)
	a)	State the products of blast furnace used in extraction of iron.	R	6	
	b)	Define alloy and state its types.	R	6	
	c)	Define cloud point and pour point	R	5	
	d)	State any four characteristics of good paint.	R	7	
	e)	State the constituents of varnish.	R	7	
	f)	Write any two drawbacks of natural rubber.	R	7	
Q.5		Attempt any FOUR			(16)
	a)	Explain froth floatation method.	U	6	
	b)	Distinguish between Calcination and Roasting.	U	6	
	c)	Mention any four functions of good lubricant.	R	5	
	d)	Select lubricant and write operating conditions for – (i) Cutting tools, (ii) Sewing machine.	A	5	
	e)	State any four properties and uses of thermocole.	R	7	
	f)	Write four characteristics of good adhesives.	R	7	
Q.6		Attempt any FOUR			(16)
	a)	Distinguish between cast iron and wrought iron.	U	6	
	b)	State composition, properties and applications of monel metal.	R	6	
	c)	Define paint. State constituents of paint and write functions of any two constituents.	R	7	
	d)	Write any two properties and any two applications of composite materials.	R	7	
	e)	Distinguish between thermosoftening and thermosetting plastics.	U	7	
	f)	Explain vulcanization of rubber.	U	7	

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EXAM SEAT NO.

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LEVEL :- FORUTH **PROGRAM : METALLURGY**

COURSE CODE MTE405

COURSE NAME :- FAILURE ANALYSIS & SELECTION OF MATERIAL

MAX. MARKS : 80 **TIME : 3 HRS.** **DATE :- 27 / 11/ 2018**

Instruction :-

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

QN	S	Section- I	Marks
Q.1		Attempt any FOUR :	08
	a)	What is meant by 'Fracture Toughness'?	
	b)	Define creep.	
	c)	Write the three types of fatigue loading.	
	d)	Enlist the different types of fractures.	
	e)	Define brittle failure.	
	f)	What is stress raiser?	
Q.2		Attempt any FOUR :	16
	a)	What are the factors which can cause brittle failure?	
	b)	What will be the difference in fracture between steel and cast iron subjected it tension?	
	c)	What is the goal of failure analysis?	
	d)	What are the different material stressors?	
	e)	How fracture toughness is used to predict performance of components?	
	f)	What are the steps in failure investigation?	
Q.3		Attempt any TWO :	16
	a)	What is DBTT? What are the factors which influence DBTT?	
	b)	Explain the mechanism of fatigue failure. What is meant by critical crack size?	
	c)	Explain the following. i) Stress corrosion cracking ii) Content of failure analysis report. iii) Torsional failures.	

P.T.O.

QN	SQN	Section- II	Marks
Q.4		Attempt any FOUR :	08
	a)	State the difference between low alloy and high alloy steels.	
	b)	Define 'Erosion'.	
	c)	Suggest suitable material for piston ring and justify.	
	d)	State chemical composition and applications of martensitic stainless steel.	
	e)	Define 'formability'. Write its importance.	
	f)	Write two situations that involve a material selection problem.	
Q.5		Attempt any FOUR :	16
	a)	Explain the requirements of heat resistance alloys. Write classification of heat resistant alloys.	
	b)	Define weldability. Explain the factors affecting weldability.	
	c)	Explain how tool steels are different from alloy steels.	
	d)	Differentiate between hard magnets and soft magnets.	
	e)	Suggest suitable material for following components and justify your selection. i) Crankshaft ii) Gear for four wheeler. iii) Lathe bed.	
	f)	Explain steps involved in material selection.	
Q.6		Attempt any TWO :	16
	a)	Differentiate between austenitic and martensitic stainless steels.	
	b)	Select a material for any two the following components. Justify your selection by considering all service conditions. i) Balls in boil mill. ii) Boiler tubes. iii) Railway wheel.	
	c)	Explain chemical composition, properties and applications of cold working dies. Differentiate between metallic wear and abrasive wear.	

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EXAM SEAT NO.

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LEVEL: **FOURTH**

PROGRAM: **METALLURGY**

COURSE CODE: **MTE401/MTF310**

COURSE NAME: **METAL WORKING PROCESS**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **30/11/2018**

Instruction:-

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

Section – I

Marks

Q.1 Attempt any **FOUR**

(08)

- a) What are various starting materials for drives in wire drawing?
- b) What are the different materials used to manufacture rolling rolls?
- c) State various wire drawing defects.
- d) What are open and closed passes in rolling?
- e) Give the size ranges of starting materials in wire drawing operation.
- f) What is Hot working & Cold working?

Q.2 Attempt any **FOUR**

(16)

- a) What is 'Mean Scale' which develops on the starting material of wire drawing? How it originates?
- b) State the factors on which the spread rolling in plane rolls depends? Explain the different factors influencing the spread.
- c) What is top pressure & bottom pressure in rolling?
- d) What are the common rolling defects? Describe any three in terms of causes and remedies.
- e) Explain effects of plastic deformation on structure and properties of materials.
- f) Classify metal forming processes and explain in brief.

Q.3

Attempt any **TWO**

(16)

- a) Draw neat sketch of different types of rolling mills & explain in brief.
- b) Which are different materials used for wire drawing dies? With neat sketch explain various zones in wire drawing dies?
- c) Explain in brief
 - i) Patenting.
 - ii) Rolling of tubes.

P.T.O

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

- a) State piercing operation in sheet metal working.
- b) What is spring back?
- c) State the problem of oxidation in forging.
- d) What is forging temperature interval?
- e) Write disadvantages of indirect extrusion.
- f) What are axial holes produced in extrusion as defect?

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

- a) Describe extrusion on tubes.
- b) What is bending? Explain the method of correcting spring back in bending.
- c) Describe stretch forming.
- d) Explain power hammer (steam hammer)
- e) Describe Hydrostatic extrusion.
- f) Explain
 - i) Forging press
 - ii) Function of flash in forging.

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

- a) Distinguish between open die and closed die forging.
- b) What is the role of mandrel in extrusion? Describe types of mandrels used in extrusion.
- c) i) Explain deep drawing operation in sheet metal working.
ii) Describe progressive forging.

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LEVEL: FOURTH**PROGRAM: METALLURGY****COURSE CODE: MTF401/MTE402****COURSE NAME: PHYSICAL METALLURGY -II****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 01/12/2018****Instruction:-**

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

QN	S Q N	Question Text	R U A	CO MTF 401	Marks
Section -I					
Q.1		Attempt any FOUR			(08)
	a)	Define "Isothermal cooling".	R	1	
	b)	Write difference between upper bainite & lower bainite.	U	1	
	c)	Write four objective of normalizing process.	A	2	
	d)	Enlist hardening method.	R	3	
	e)	Define hardening & hardenability.	R	4	
	f)	Explain 'After tempering ductility increases'.	A	5	
Q.2		Attempt any FOUR			(16)
	a)	Draw & explain TTT diagram.	U	1	
	b)	Distinguish between Martensitic & Pearlitic structure.	U	1	
	c)	Enlist the names of Annealing methods & explain any one.	R	2	
	d)	Explain Mechanism of heat removal during quenching.	U	3	
	e)	Explain Jominy end quench test.	U	4	
	f)	Write short note on secondary hardening.	A	4	
Q.3		Attempt any FOUR			(16)
	a)	Draw & explain CCR diagram.	A	1	
	b)	Write effect of alloying element on i) TTT diagram. ii) Hardenability.	A	1	
	c)	Explain any two quenching media used for hardening process.	U	3	
	d)	Explain with diagram Martempering hardening process.	U	5	
	e)	Write note on hardenability and hardness penetration curve.	U	4	
	f)	Explain structural changes during tempering.	U	5	
P.T.O					

Section-II				
Q.4	Attempt any FOUR			(08)
	a) Write applications of carburising heat treatment.	U	5	
	b) Draw diagrammatic representation of induction hardening process.	R	5	
	c) List heat treatment recommended for Malleable cast iron.	U	7	
	d) State the purpose of normalizing heat treatment on SG iron.	U	7	
	e) Which heat treatment are done on Al-copper alloy and why?	R	8	
	f) What precaution has to be taken in heat treatment shop?	U	10	
Q.5	Attempt any FOUR			(16)
	a) Explain the mechanism of hardening by coherent particles theory.	U	9	
	b) Explain the heat treatment of annealing done on aluminum alloy.	U	8	
	c) What are advantages and disadvantages of pack carburising?	R	5	
	d) Explain process of liquid carburising done on steel components?	U	6	
	e) Describe hardening and Tempering of grey cast iron.	A	6	
	f) Explain progressive spin flame hardening process.	U	6	
Q.6	Attempt any FOUR			(16)
	a) Describe the process of cyaniding write its applications (any two)	U	6	
	b) Write limitations and advantages of Nitriding.	U	6	
	c) What are advantages and applications of laser hardening?	U	5	
	d) List applications and advantages of flame hardening process of heat treatment.	A	5	
	e) List various heat treatments carried on Mg-alloys. Write its applications (any two)	A	8	
	f) Explain steeps in precipitation hardening.	U	9	
