Set-05

UT-I

ANJUMAN-I-ISLAM'S
KALSEKAR TECHNICAL CAMPUS, NEW PANVEL
School of Engineering&Technology
FIRST UNIT TEST

Subject: Applied Mathematics I

Date: 05/09/2013

Branch:CE/ME (Sem I)

(FE)

Marks: 20

Duration: 1 Hr

(2013-14)

Note: Q I is compulsory (2x4=8 marks)

Solve any one from the remaining two

QI   (a) Find Laplace transform of $t \cdot \sqrt{1 + \sin t}$

(b) Using Laplace transform evaluate $\int\limits_{0}^{\infty} e^{-t} \dfrac{\sin 3t}{t} \, dt$.

(2x6 =12)

QII   (a) Find inverse Laplace transform of —

(i) $\log\left(\dfrac{s-2}{s-3}\right)$ (ii) $\dfrac{s+1}{\left(s^2 - 4\right)}$

(b) Construct the analytic function whose real part is $e^{2x}(x \cos 2y - y \sin 2y)$. Also veri'
that v is harmonic.

QIII   (a) Using Laplace transform solve the differential equation

$$\frac{d^2 y}{dt^2} - 2\frac{dy}{dt} - 8y = 4, \ y(0) = 0 \ \& \ y'(0) = 1$$

(b) State Cauchy-Riemann equations in polar co-ordinates and prove it

AKTC KALSEKAR TECHNICAL CAMPUS

INNOVATIVE TEACHING   EXUBERANT LEARNING

Applied Maths I

Marks – 20   Date - 5/9/2013

(2013 – 14)

Q 1 Attempt any two questions out of three.   (8)

i) Prove that every square matrix A can be uniquely expressed as a sum of one symmetric and one skew symmetric matrices.

ii) Find a, b , c if matrix A is orthogonal . $A = \dfrac{1}{9}\begin{pmatrix} -8 & 4 & a \\ 1 & 4 & b \\ 4 & 7 & c \end{pmatrix}$

iii) If α and β are roots of the equation $x^2 + 2x + 4 = 0$ prove that

    $\alpha^6 + \beta^6 = 128$

Q 2 Attempt any two questions out of three.   (12)

 i) Investigate for what value of λ and μ the equations

    $2x + 3y + 5z = 9$, $7x + 3y - 2z = 8$, $2x + 3y + \lambda z = \mu$ have i)no solution,

      ii)a unique solution , iii) an infinite number of solutions.

ii) Find non singular matrices P and Q such that PAQ is in the normal form.

      $A = \begin{bmatrix} 1 & 2 & 3 & -2 \\ 2 & -2 & 1 & 3 \\ 3 & 0 & 4 & 1 \end{bmatrix}$

iii) If $\cos 6\theta = A\cos^6\theta + B\cos^4\theta \sin^2\theta + C\cos^2\theta \sin^4\theta + D\sin^6\theta$

    find A,B,C,D and prove that A + B + C + D = 0

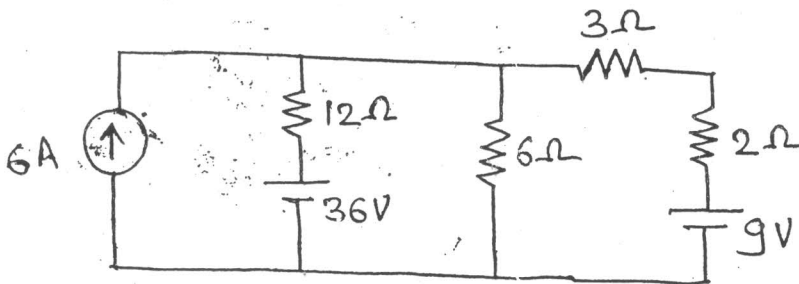|	
Subject : Basic Electrical and Electronics Engg.	**Marks: 20**
Test : Unit test – I	**Duration: 1 Hrs**
Class : FE (Sem I) , Unit Test I	**Branch :** ALL 2013~14

Instructions:

1. Figures to the right indicate full marks.
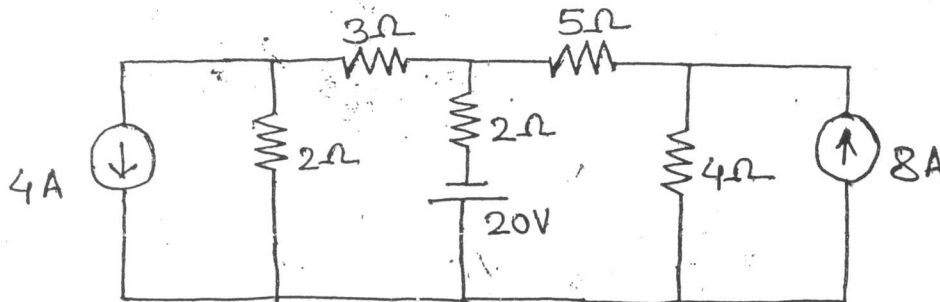2. Make suitable assumptions wherever necessary.

Q.1) Attempt **any two**

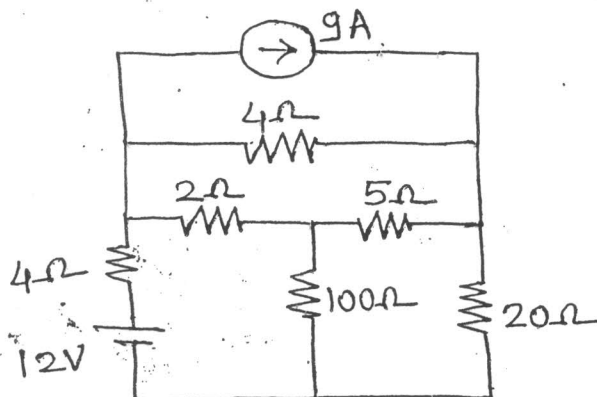a) find current flowing through 2Ω, by using mesh analysis. (5)

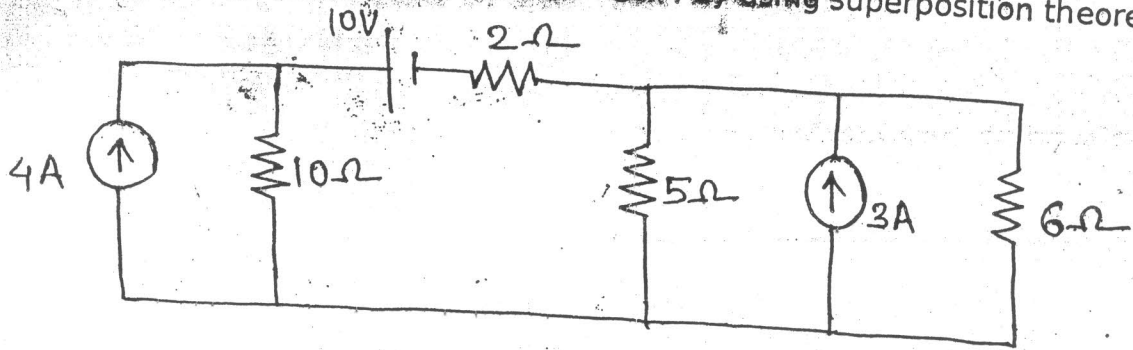3A

b) find current flowing through 5Ω, by using nodal analysis. (5)

4.65

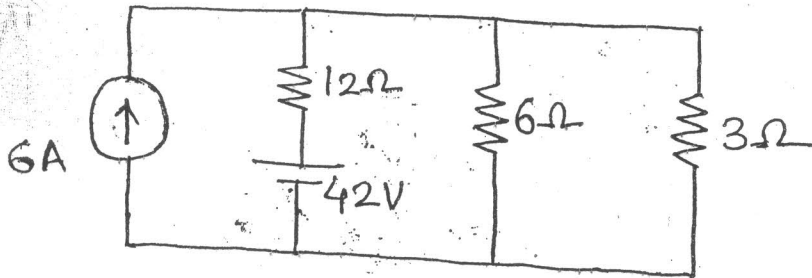c) find current flowing through 5Ω, by using nodal analysis. (5)
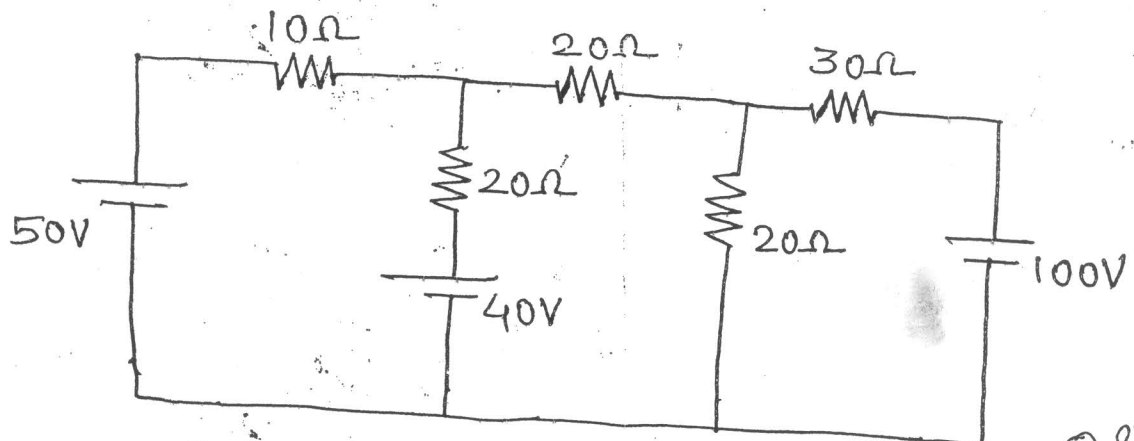

-9.91
13.36

Q.2) Attempt any two

a) find current flowing through 6Ω, by using superposition theorem.

b) find current flowing through 3Ω, by using thevenin's theorem.   (5)

c) find current flowing through 10Ω, by using nortons theorem.   (5)

O.28

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KALSEKAR TECHNICAL CAMPUS, NEW PANVEL
School of Engineering & Technology

Subject: Applied Physics-I	Marks: 15
Date: Sept. 2013	Duration: 1 Hour
Class : FE (Sem I)	Branch : ALL

Semester-I, TEST -I
(2013 –14)

Note: All questions are compulsory.

Q.1 Attempt any three from the following: (3*3=9)

(a) State and explain Sabine's Formula.

(b) Explain in brief, what are the conditions of Good Acoustics for a Hall.

(c) Discuss Magnetostriction effect.

(d) Discuss any three applications of Ultrasonic waves.

Q.2 Attempt any two from the following: (3*2=6)

(a) For an empty assembly Hall of size 20x15x10 cubic meter with absorption coefficient 0.106. Calculate reverberation Time.

(b) Calculate the change in intensity level when the intensity of sound increases 1000 times its original intensity.

(c) Calculate the thickness of quartz plate which is used to produce ultrasonic waves of 2 MHz. If Density=2.65×10^3 kg/m^3, Young's Modulus=8×10^{10} N/m^3.

Subject : Applied Chemistry I	Marks: 15
Test : I	Duration: 1hr
Class : FE (Sem I)	Branch : All
DT : 06/09/13	

Unit Test I (2013-1H)

Instructions:

   At Wts: H=1,C=12,O=8,S=32,Cl=35.5,Na=23,Mg=24,Ca=40,N=14,Si=28,K=39

   Note : 1. Question **No 1** is compulsory.

   2. Attempt **any one** from the remaining two questions

Q1 Attempt **any three** of the Following: 6M

   a. Define Viscosity Index and give its significance?

   b. Define Hard water and give reactions involved in it?

   c. Distinguish between Alkaline and Non-Alkaline Hardness of water?

   d. Find acid value of 3 gm of an oil which required 0.2 ml of 0.025N KOH to neutralize free acid present?

Q2 Attempt the Following:

   a. Explain the mechanism of lubrication for machine operating under high load and low   5M
   speed with suitable example?

   b. A water sample contains following impurities per litre :   4M
   $Mg(HCO_3)$=73mg/l,$Ca(HCO_3)$=81mg/l,$MgSO_4$ = 60 mg/l,$CaSO_4$=68 mg/l,
   KCl=100mg/l ,CO_2 = 12mg/l

Q3 Attempt the Following:

   a. Write a short note on Solid Lubricants?   5M

   b. 5gms of oil was saponified using 50ml of alc KOH (0.7gms per 50 ml).   4M
   The mixture required 10ml of 0.25NHCl while blank titration reading was 40ml of
   same HCl.Find the saponification value of oil?

Subject: Environmental science   Date: 7/9/13

Marks: 15   Duration: 1 Hr/s

Class: FE (Sem I) Unit Test I   Branch: FE (A+1) — 2013-14

Instructions: 1. Question No. 1 is **compulsory**
2. Attempt any 2 questions out of remaining 3 questions.
3. Figures to the **right** indicate marks

1. What is environmental degradation, state its two main causes?   (5)

2. Define the following-
   (a) Environment   (b) Non renewable energy resources (5)
   (c) Food web   (e) Pollution
   (g) Ozone layer

3. Write short note on-   (5)
   (a) Forest resources
   (c) Food chain

4. What is air pollution? Write its causes and effects.   (5)

Subject : Engineering Mechanics   Marks: 20   Sept. 13
Test : Unit Test I   Duration: 1 Hr
Class : F.E. (Sem I) Unit Test I   Branch : A,D.
   (2013-14)

Instructions:
1. Use of electronic calculators is allowed.

Q.1. Attempt any six of the following questions (2 marks x 6 =12 marks).
   a. State the Triangle Law of Forces.
   b. What is meant by a Free Body Diagram?
   c. State Varignon's Theorem.
   d. Combine a couple C1 = +20 Nm with a couple C2 = -50 Nm both in the same plane.
   e. State the conditions of equilibrium of a Non-Concurrent, Non-Parallel Spatial Force System.
   f. A 8 kN force is acting at an angle of 45° at the point (6,1)m. Find the moment of this force about the origin.
   g. Determine the resultant of the coplanar force 100 N, 0° and 200 N, 90°.

Q.2. Attempt any two of the following questions (4 marks x 2 = 8 marks).

   a. A semicircular area is removed from the trapezoid as shown in the figure. Determine the centroid of the remaining area.
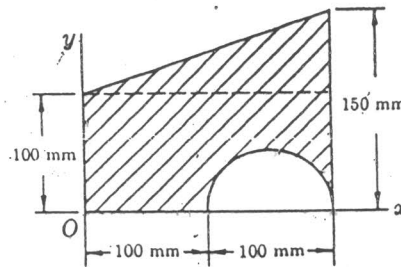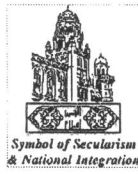

   b. A 500 kg mass is hung on a rope in a tripod with legs of equal length, as shown in the figure. Each leg makes an angle of 30° with the rope. A, B and C are in the horizontal plane and form an equilateral triangle. Determine the force in each leg.
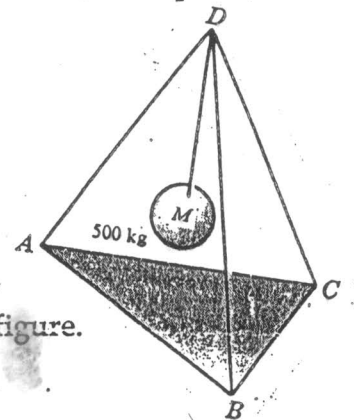
   c. Determine the resultant of the parallel system of forces as shown in the figure.
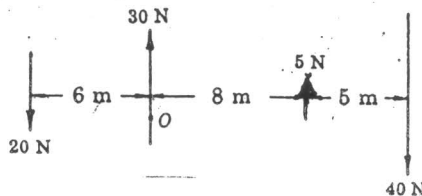
Subject	: Engineering Mechanics	Date:	Sept.13
Max Marks:	20	Duration:	1:00 Hr/s
Class	: F.E (B) (sem I) Unit Test I	Branch:	EXTC

(2013-14)

Instructions: 1) Q1 and Q2 both are Compulsory
2) Assume data wherever necessary

Q.1 Answer the following Question (6*2 = 12 Marks)

I. State Law of Transmissibility and Parallelogram law of Forces?

II. Define Axis of Symmetry? Give the formula for X , Y and Area of Plane Lamina for the Figures (a) and (b) Shown below about the reference axis?

Fig (a)   Fig (b)

III. States Varignon's Theorem of Coplanar Forces?

IV. Define Moment, Couple and State the characteristics of Couple?

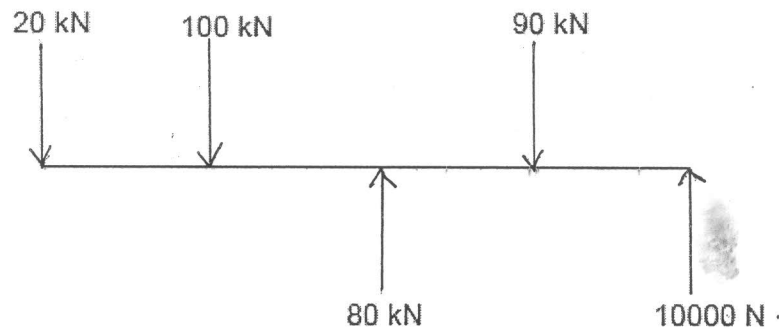V. Find the Resultant of Parallel Force System as Show in Fig (c) ?

Fig (c)

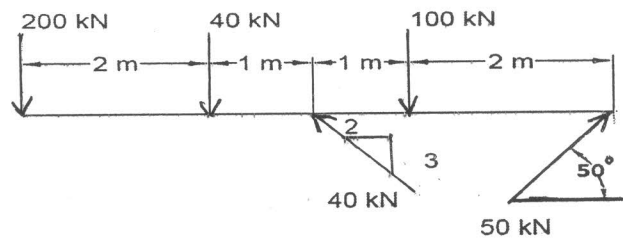VI. Find the Resultant of Coplanar Force System shown if Fig (d)?

200 kN   40 kN   100 kN

|← 2 m →|← 1 m →|← 1 m →|← 2 m →|

2

3

40 kN

50°

50 kN

Fig (d)

Q2. Solve the Following (Any Two)   (4*2 =08 Marks)

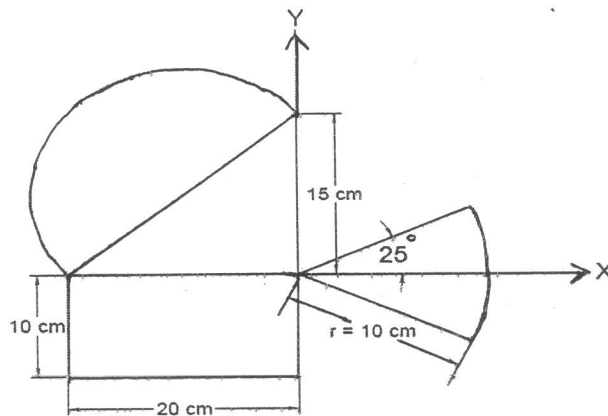I. Find out the Center of Gravity of Plane Lamina shown if Fig (e)?

15 cm

25°

X

10 cm

r = 10 cm

20 cm

Fig (e)

II. A Dam is subjected to 3 Forces 50 kN on the upstream Face "AB", 30 kN on the Down Stream Inclined face and its own weight of 120 kN as shown in Fig (f). Determine the Resultant, its Direction and Position.
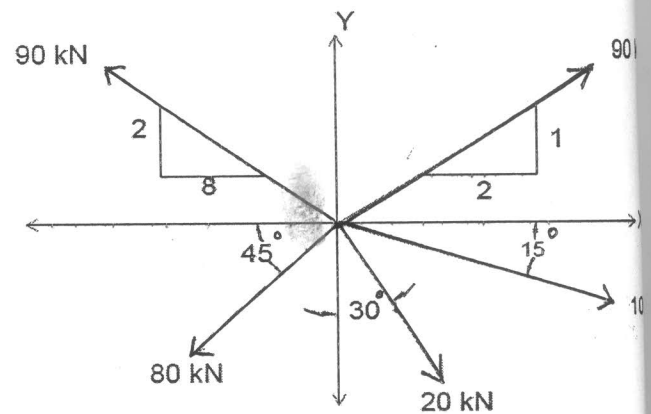
2.5 m

B   C

4m

2 m

100 kN

30 kN

50 kN

2m

1.5 m

A   D

5 m

Fig (f)

Y

90 kN   90

2   1

8   2

45°   15°

30°   10

80 kN   20 kN

Fig (g)

III. Find Magnitude, Direction   of the Resultant, of a give Coplanar-Concurrent Forces as shown in Fig (g) ?

Subject: Engineering Mechanics	Date: 06.08.2013
Marks: 20	Duration: 01Hr
Class: FE – Division C (Sem I) Unit Test I	Branch: Mechanical Engg.

(2013-14)

Instructions: 1. All questions are compulsory.
2. Figures to the right indicate maximum Marks.
3. Use of non-programmable calculator is permitted.
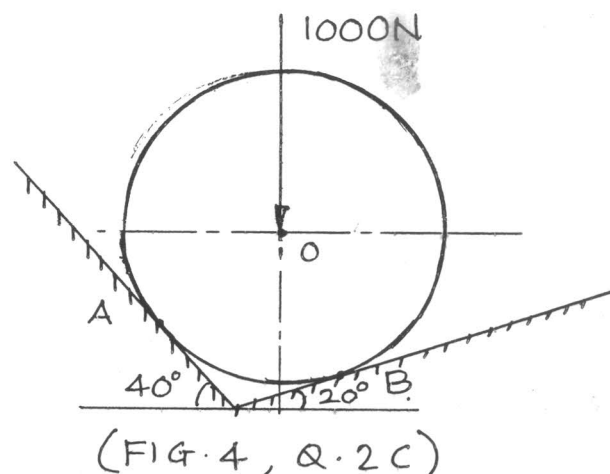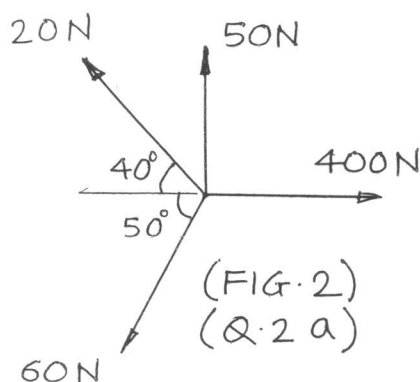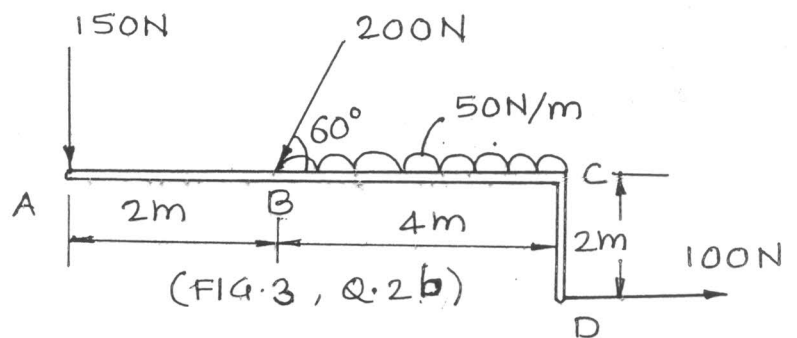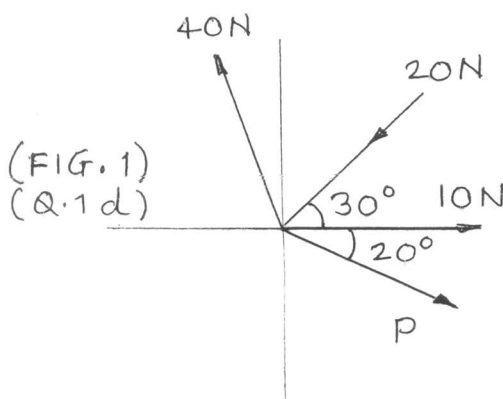
1. Attempt Any Four.   (12)
    a. State & explain Lami's Theorem
    b. Define force, how to represent it graphically, give its characteristics also.
    c. Classify force system
    d. State Law of parallelogram of forces & explain
    e. Find the unknown force P for the equilibrium force system as shown in fig.1
    f. Three forces 100N, 200N & 300N acts at 30^0, 100^0 & 330^0 from x- axis. Find resultant in magnitude & direction.

2. Attempt Any Two.   (08)
    a. Find resultant in magnitude & direction for the system shown in fig.2
    b. Find resultant in magnitude & direction for the system shown in fig.3 & locate it with respect to point A
    c. A spherical ball of weight 1000 N is kept between two inclined surfaces as shown in fig.4. Find the reaction offered by the inclined surfaces for the system in equilibrium.

(FIG.1)
(Q.1 d)

(FIG.3 , Q.2 b)

(FIG.2)
(Q.2 a)

(FIG.4 , Q.2 c)

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School of Engineering & Technology

Subject: ENGINEERING MECHANICS.		Max. Marks: 20
Date: 06.08.2013	UNIT TEST (I)	Duration: 1 hr.
Class: F.E. (sem I)		DIV.: E
		(2013 - 14)

INSTRUCTIONS:

All questions are compulsory.
Use suitable data if necessary
Numbers in the parenthesis are right to indicate full marks.

Q.NO.1) Attempt any five.

    i) State Varignon's Therem.   [2]

    ii) State Principle of Transmissibility of a force.   [2]

    iii) A force of 1000 N is to be resolved into two components along line a-a and b-b as shown in fig.(1). If the component along b-b is 350 N. Find angle 'α' and component along a-a .   [2]
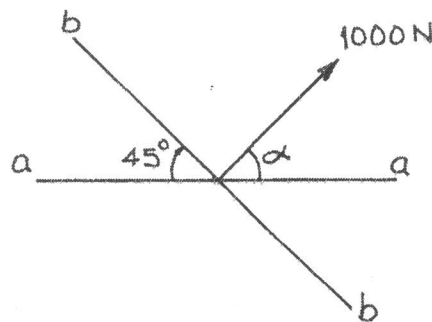
Fig.(1)

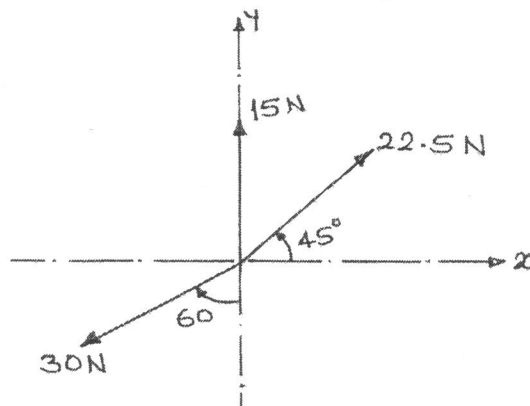   iv) Find the resultant of the force system. Use fig.(2).

Fig.(2)   [2]

v) For a given force system determine i) The required value of 'α' if resultant of three forces is to be vertical & ii) The corresponding magnitude of resultant. Use fig.(3) [2]
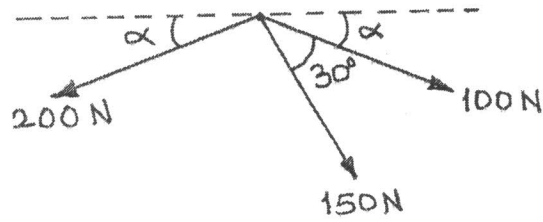

Fig.(3)

vi) Combine couple C1= +50 N-m with couple C2= -20 N-m both in the same plane with neat sketch. [2]

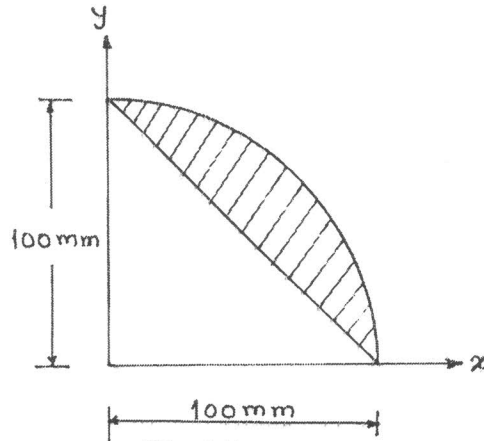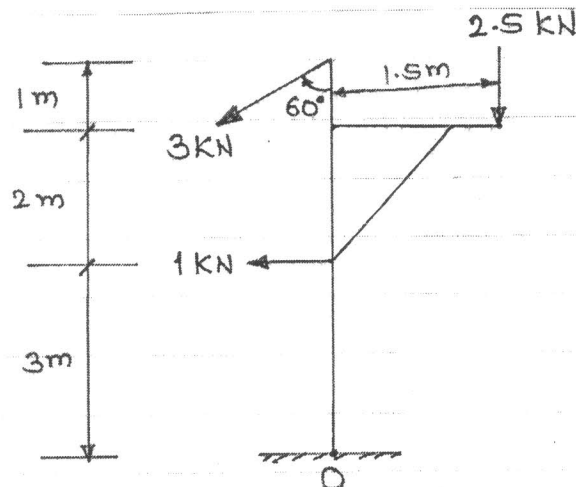Q.NO.2) a) Determine co-ordinates of centroid of shaded area as shown in fig.(4).

Fig.(4) [4]

b) Three forces are acting on a vertical pole as shown in fig.(5). Find magnitude, direction and position of the resultant of these forces with respect to 'O'.

[6]

2/2

Subject	: Engineering Mechanics	Date	: Sept. 13
Max Marks	: 20	Duration	: 1:00 Hr/s
Class	: F.E (F) (sem I) Unit Test I	Branch	: Computer
			(2013-14)

Instructions: 1) Q1 and Q2 both are Compulsory
2) Assume data wherever necessary

Q.1 Answer the following Question (6*2 = 12 Marks)

I. State Law of Transmissibility and Parallelogram law of Forces?

II. Define Axis of Symmetry? Give the formula for X , Y and Area of Plane Lamina for the Figures (a) and (b) Shown below about the reference axis?
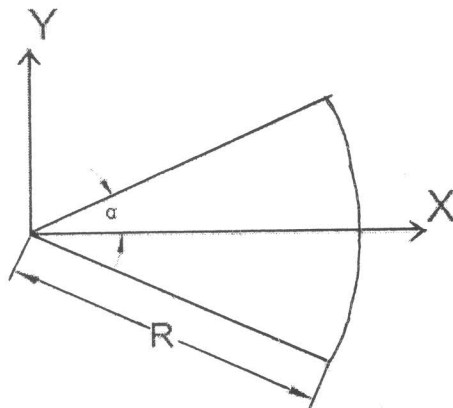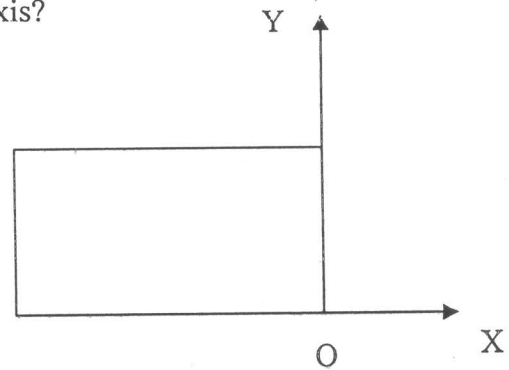

Fig (a)

Fig (b)

III. States Varignon's Theorem of Coplanar Forces?

IV. Define Moment, Couple and State the characteristics of Couple?

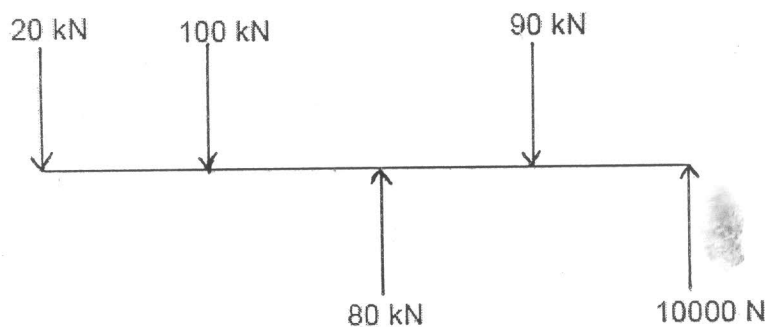V. Find the Resultant of Parallel Force System as Show in Fig (c) ?

Fig (c)

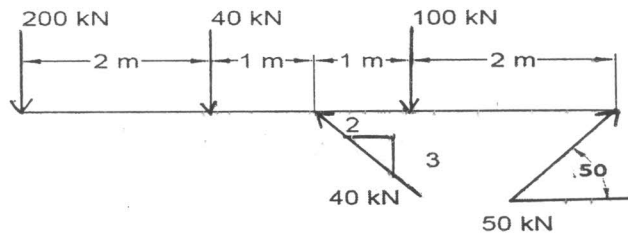VI. Find the Resultant of Coplanar Force System shown if Fig (d)?

Fig (d)

Q2. Solve the Following (Any Two) (4*2 =08 Marks)

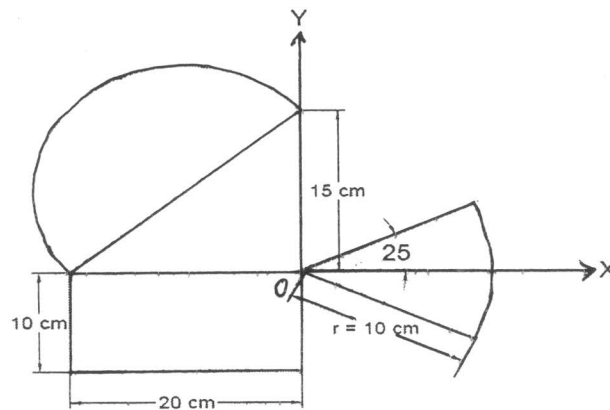I. Find out the Center of Gravity of Plane Lamina shown if Fig (e)?

Fig (e)

II. A Dam is subjected to 3 Forces 50 kN on the upstream Face "AB", 30 kN on the Down Stream Inclined face and its own weight of 120 kN as shown in Fig (f). Determine the Resultant, its Direction and Position.
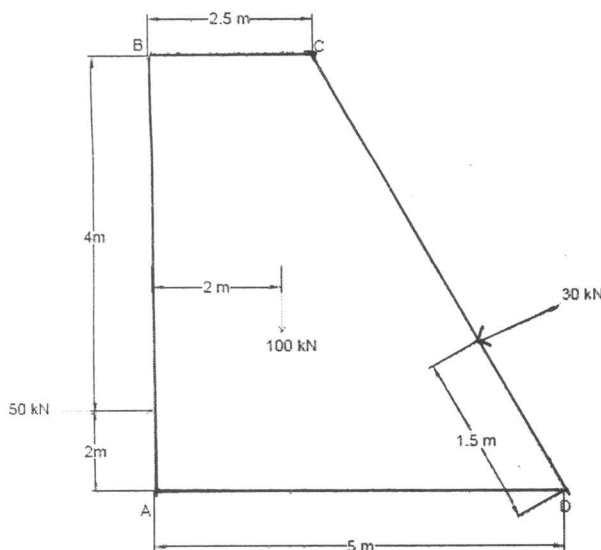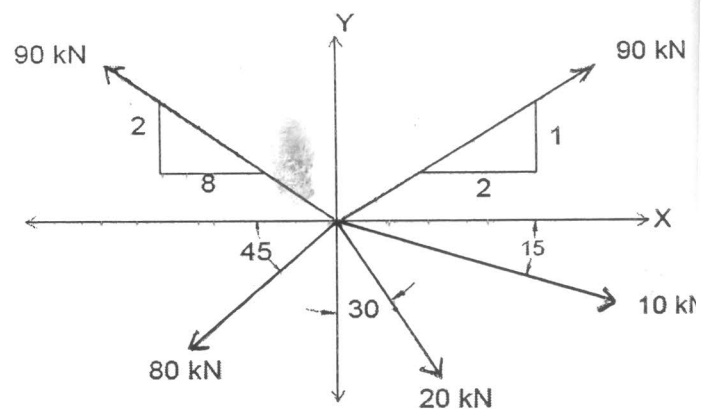

Fig (f)

Fig (g)

III. Find Magnitude, Direction of the Resultant, of a give Coplanar-Concurrent Forces as shown in Fig (g) ?

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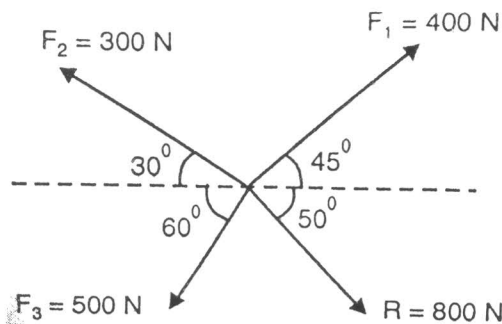|	
Subject: Engineering Mechanics	Date: Sep9·13
Marks: 20	Duration: 1 Hr
Class: FE- G Div (Sem I) Unit Test I	Branch: Civil (Second Shift)

(All questions are compalsory)   (2013-14)
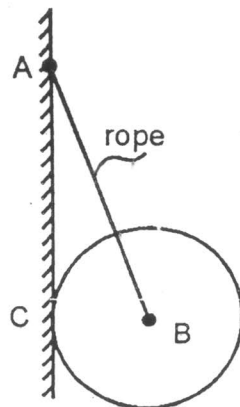
Q1 Solve any three (12 Marks)

1) State and prove Varignons theorom   4
2) Find the resultant of the forces shown in figure   4

$F_2 = 300$ N $F_1 = 400$ N

30^0 45^0
60^0 50^0

$F_3 = 500$ N   R = 800 N

3) A roller of weight W= 1000 N and radius 20 cm hang by a rope AB of length 40 cm and rests against a smooth vertical wall at C as shown. Determine the tension in the rope and reaction at C
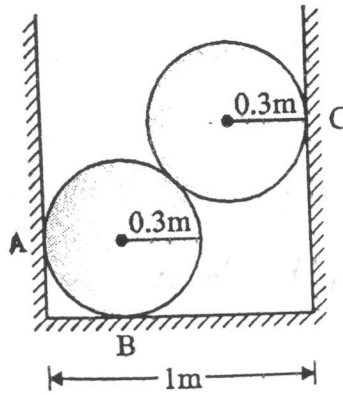
4

A

rope

C

B

4) The cylindrical rollers of weight 90 N each are placed inside a cup. Find reactions at points of contact.
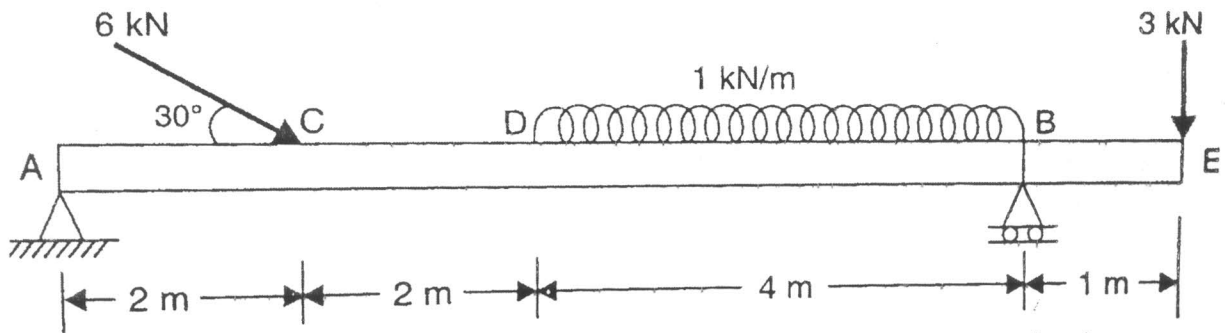
4
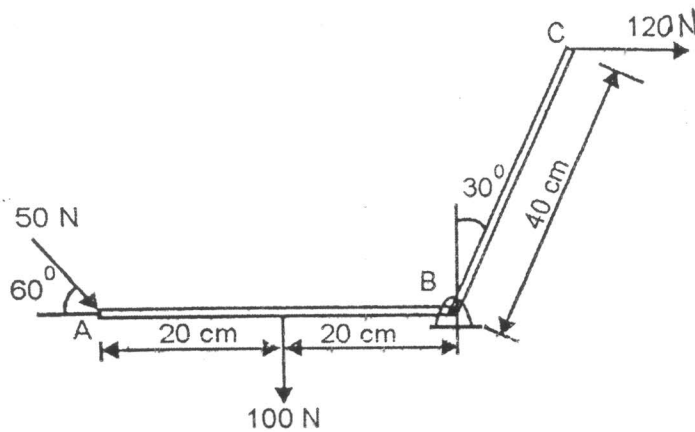

Q-2 Solve <u>Any One</u> (8 Marks)
1) Find the reactions at supports

8

2) Find the resultant of the forces acting on the bell crank lever as shown in figure. Also locate its position with respect to point B. (Don't find the position where resultant cuts X and Y axis)

8

----------------Best of Luck------------------

Page 2 of 2