

FACULTY OF ENGINEERING & INFORMATICS

B.E. I-Year (Common to all Branches) (Main) Examination, June 2013

Subject: Engineering Physics

Time: 3 Hours

Max.Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.**PART – A (25 Marks)**

1. What are the basic principles of Holography? (2)
2. If the diameter of two consecutive Newton's rings in reflected light of wave length 5890 \AA are 2.0 and 2.02 cms respectively. Calculate the radius of curvature of the lens. (2)
3. Obtain Rayleigh-Jeans law and Wein's law from Planck's law. (2)
4. Define pointing vector. (2)
5. Calculate the packing fraction for SC, BCC and FCC crystals. (3)
6. The intrinsic carrier density at 300 K in silicon is $1.62 \times 10^{16}/\text{m}^3$. If the electron and hole mobilities are 0.13 and $0.06 \text{ m}^2 \text{ V}^{-1} \text{ S}^{-1}$ respectively. Calculate the conductivity of intrinsic silicon. (3)
7. Distinguish hard and soft magnetic materials. (2)
8. Distinction between bulk, thin films and nano materials. (3)
9. What are type II superconductors? Explain their importance. (3)
10. What is sputtering? Explain the advantages of sputtering deposition. (3)

PART – B (50 Marks)

- 11.(a) Describe Fraunhofer diffraction of light due to single slit and explain maxima and minima conditions and derive the expression for resultant intensity. (6)
- (b) Explain the working of He-Ne laser with the help of neat diagram by giving energy level transitions. (4)
- 12.(a) Derive the expression for Planck's law of radiation by considering the Bose-Einstein distribution function. (5)
- (b) Derive an expression for the velocity of propagation of a plane e.m. wave in homogeneous, isotropic dielectric medium by using Maxwell's equations. (5)
- 13.(a) Explain the salient features of Kronig-Penny model and its conclusions for formation of energy bands in solids. (6)
- (b) State and explain the Miller Indices. (4)
- 14.(a) What are dielectrics? Explain different types of electric polarization mechanisms contributing to the total polarization of dielectric materials. (6)
- (b) What is superconductivity? Describe the preparation of high T_c superconductors. (4)
- 15.(a) Explain the construction and working of TEM-transmission electron microscope. (6)
- (b) Describe the chemical vapour deposition (CVD) method for preparation of thin films. (4)
- 16.(a) Explain the preparation of nano materials by sol-gel method. (5)
- (b) What is the principle of X-ray fluorescence and mention its applications? (5)
- 17.(a) Describe the powder diffraction experimental method for determination of "interplanar spacing" of a crystal. (5)
- (b) What are ferrites? Explain its spinel and inverse spinel structure. (5)

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PART – B (50 Marks)

1. What efforts did Muthyala Raju make to get into IAS?
2. What is the secret of Indra Nooyi's success?
3. Explain the importance of oral communication.
4. Explain the features of human communication.
5. Imagine that you are the Student Coordinator of the Technical Fest to be held in your college and you organized a meeting with student executives regarding the arrangements of the Fest. Write the minutes of the meeting.
6. Write about the essential features of a report.
7. Imagine that you are the chief sales executive of your company and you received a letter of complaint from one of your customers regarding the bad service of your company. Write a response letter to the complaint.

FACULTY OF ENGINEERING & INFORMATICS

B.E. I-Year (Common to All) (Main) Examination, June 2013

Subject : **Mathematics - II**

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.**PART – A (25 Marks)**

1. Form the differential equation by eliminating the arbitrary constant λ from $x^2+y^2+2\lambda x=0$. (2)
2. Solve $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$ (3)
3. Solve $y''-y=0$, $y(0)=0$, $y'(0)=2$ (3)
4. Find the particular integral of $(D^2-1)y=8e^{3x}$ (2)
5. Find the Laplace transform of $\sin 2t \sin 3t$. (2)
6. Find the inverse Laplace transform of $\frac{2s-5}{s^2-4}$ (3)
7. Show that $P_n(1)=1$. (2)
8. Show that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ (3)
9. Evaluate $\int_0^{\infty} x^2 e^{-x^2} dx$ (2)
10. Show that $\int_0^1 \left(\log \frac{1}{x}\right)^{n-1} dx = \Gamma(n)$ (3)

PART – B (5x10=50 Marks)

- 11.(a) Solve $(3x^2y^3e^y+y^3+y^2)dx+(x^3y^3e^y-xy)dy=0$ (5)
- (b) Solve $\frac{dy}{dx} - y = y^2(\sin x + \cos x)$. (5)
- 12.(a) Find the general solution and singular solution of the Clairaut's equation $y=xy' - (y')^3$. (5)
- (b) Solve the initial value problem $y''' - 5y'' + 7y' - 3y=0$, $y(0)=1$, $y'(0)=0$, $y''(0)=-5$. (5)
- 13.(a) Solve by method of variation of parameters $(D^2+4)y=\tan 2x$. (5)
- (b) Solve $y''-4y'+13y=12e^{2x} \sin 3x$. (5)
14. Find the series solution about $x=0$ of the differential equation. $(1-x^2)y''-2xy'+2y=0$ (10)
- 15.(a) Prove that $\int_{-1}^1 P_m(x)P_n(x)dx = \begin{cases} 0 & \text{if } m \neq n \\ \frac{2}{2n+1} & \text{if } m=n \end{cases}$ (5)
- (b) Find the Laplace transform of $t \sin^2 3t$. (5)
- 16.(a) Apply convolution theorem to evaluate $L^{-1} \left\{ \frac{s}{(s^2+4)(s^2+9)} \right\}$ (5)
- (b) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$ (5)
- 17.(a) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ (5)
- (b) Prove that $T_{n+1}(\lambda) - 2\lambda T_n(\lambda) + T_{n-1}(\lambda) = 0$ (5)

FACULTY OF ENGINEERING & INFORMATICS

B.E. I-Year (Main) Examination, June 2013
(Common to All Branches)

Subject : **English**

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A in the same order as they appear and answer any five questions from Part-B.

PART – A (25 Marks)

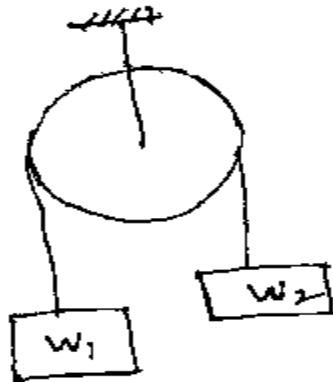
- I. Rewrite the following sentences after making necessary corrections.**
1. Either you or he are mistaken.
 2. He rode so fast that no other person can keep pace with him.
- II. Fill in the blanks with suitable options given in brackets.**
1. I _____ a new bike last week. (purchased, have purchased, had purchased)
 2. Let's wait till she _____ her work. (finish, finishes, finished)
- III. Convert the following into active voice.**
1. All the chocolates had been eaten by the children by that time.
 2. Elders should be respected.
- IV. Fill in the blanks with suitable connectives given in brackets.**
1. It was not a good restaurant. _____ it was very expensive.
(Otherwise, Besides, As a result)
 2. I must leave now. _____ if you want that CD I will bring it next time.
(In addition, By the way, Yet)
- V. Fill in the blanks with appropriate prepositions.**
1. The driver jumped _____ the bus.
 2. Pay careful attention _____ what I am going to say.
- VI. Fill in the blanks with suitable options given in brackets.**
1. What Bhargavi said is _____ right. (quiet/quite)
 2. Our management has found a _____ for the construction of degree college
(site/cite)
- VII. Write antonyms of the following words.**
1. Modest
 2. Contract
- VIII. Write question tags for the following statements.**
1. I needn't come again, _____?
 2. Your sister can dance well, _____?
- IX. Write one word substitutes for the following:**
1. A list of subjects to be considered at a meeting.
 2. One who makes plans for new buildings.
- X. Answer the following by choosing 'Yes' or 'No' against each sentence.**
1. Human language has potential for innovation and creativity (Yes / No)
 2. Socio-cultural background of a person has no role in decoding and encoding the message or information. (Yes / No)
 3. Typographical errors is one of the mechanical barriers to communication. (Yes / No)
 4. The kind of language one uses do not depend on the context of communication. (Yes / No)
 5. Barack Obama was hired as a Community Organiser by the Developing Communities Project located in Chicago. (Yes/ No)
 6. Indra Nooyi's knowledge of cricket helped her in understanding the language of business. (Yes / No)
 7. A circular is a letter sent to a large number of people intended for wide distribution. (Yes / No)

15. Derive the expression for the acceleration of a block as shown in fig if (10)

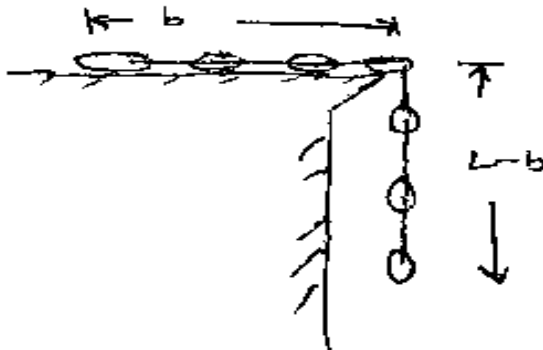
Case 1: is a frictionless pulley

Case 2 : friction pulley

($W_2 > W_1$)



16. A chain of length 'L' and weight w/m-run is released from rest on a smooth table when it is (10)



In the position as shown in fig. Determine the velocity of the chain while last link leaves the table.

17. Write a short note on :

- a) Compound pendulum (4)
- b) Rectilinear & curvilinear motion (3)
- c) Radius of gyration and instantaneous centre of rotation (3)

FACULTY OF ENGINEERING & INFORMATICS

B.E. I – Year (Main) (Common to All Branches) Examination, June 2013

Subject: Programming in C and C++

Time: 3 Hours

Max.Marks: 75

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1. Evaluate $(00001000 \& 11000101) \wedge (11110000)$.
2. What is the difference between assembly language and machine language?
3. What is the value of the expression $(0 < j < 1)$? Does this expression achieve the goal of checking that the value of j is between 0 and 1, exclusively? If so, say why? If not, write an expression that does that.
4. Consider the following function:

```
void f (unsigned int n)
{
do {
putchar ('0' + (n % 10));
} while (n / = 10);
putchar (' \n');
}

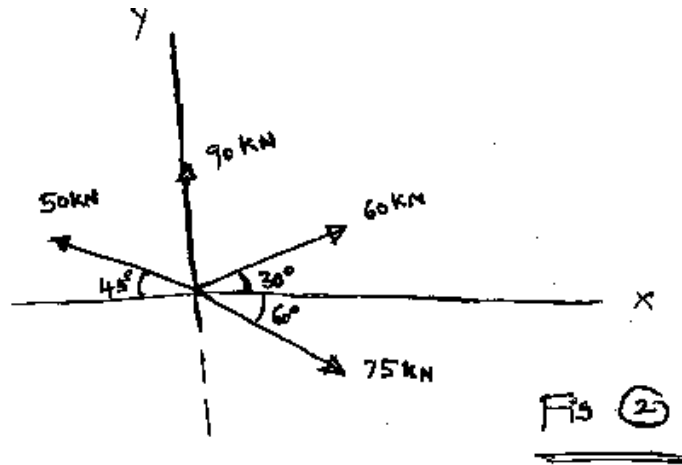
```

 What is the output of **f (837)**?
5. What is the importance or use of a static variable?
6. How does write mode differ from append mode when an existing file is being written to?
7. What are inline functions?
8. List the operators that can not be overloaded.
9. What is the purpose of abstract base class?
10. Give the three standard I/O stream objects in C++.

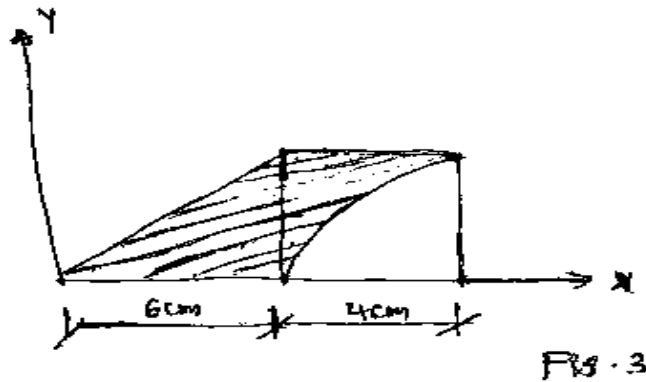
PART – B (50 Marks)

- 11.(a) Explain various steps in the development and execution of a typical C program.
 (b) Write a program to reverse a given number.
- 12.(a) Write a function to search a number in a given list of numbers using linear search.
 (b) Explain the usage of pointer variables in accessing elements in a multidimensional array.
- 13.(a) Write a program that accepts student's roll number and name and stores the details in a list of student records ordered roll-number-wise.
 (b) What is a union? How do you declare and initialize a union in a C program?

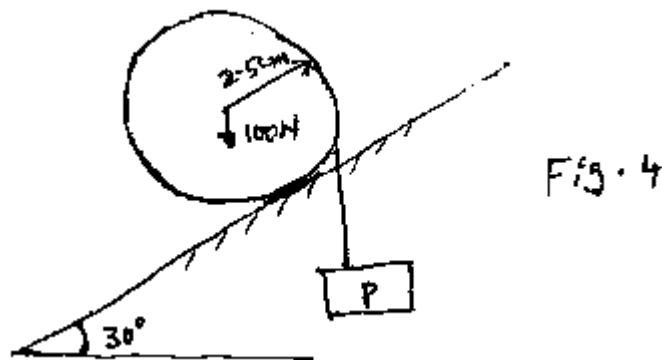
11.b) Find the resultant for concurrent co-planar force system as shown in fig.2. (5)



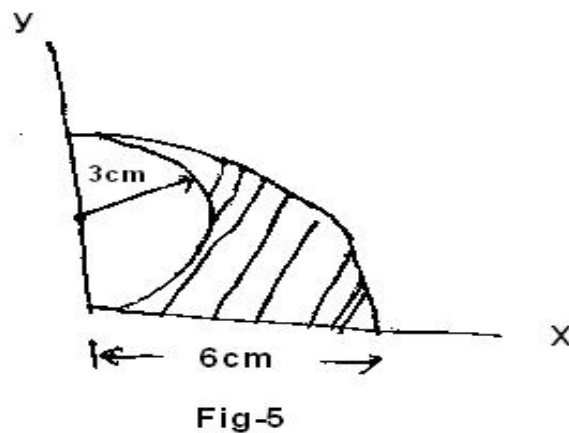
12. Locate the Centroid of the hatcher plate about the axis as shown in fig.3. (10)



13. A 100N cylinder shown in fig.4 is held at rest by a weight 'P' suspended from a chord wrapped around the cylinder if the slipping impends between the cylinder and the inclined, determine the value of 'P' & also the co-efficient of Friction. (10)



14. Calculate the product of inertia for a shaded area as shown in fig.5 with respect to given x - y axis. (10)



- 14.(a) Write a C++ program to create a RATIONAL class and find the sum of two rational numbers using operator overloading. Extend the program to add 'n' rational numbers.
- (b) How do you specify default arguments in function definition? Illustrate with an example.
- 15.(a) Explain how virtual functions are used along with base class pointers to implement run-time polymorphism.
- (b) What is the difference between function overloading and function overriding? Explain with an example.
- 16.(a) Write a C++ program using function template to perform addition, multiplication of two matrices. It should support integer, float, and double data types.
- (b) Illustrate scope rules of C language with suitable examples.
17. Write short notes on:
- (a) Passing of multidimensional arrays as arguments to functions
 - (b) Conditional compilation
 - (c) Exception handling.

FACULTY OF ENGINEERING & INFORMATICS

B.E. I Year (Main) (Common to All Branches) Examination, June 2013

Subject: Engineering Chemistry

Time: 3 Hours

Max.Marks: 75

Note : Answer all questions from Part A. Answer any Five questions from Part B.**PART – A (25 Marks)**

1. Electrode potential of zinc is assigned a negative value, whereas that of copper a positive value. Give reason. (2)
2. Construct calomel electrode with electrode notation and electrode reaction. (3)
3. What are the limitations of I law of thermodynamics? (3)
4. One mole of an ideal gas expands from 10 lit. to 25 lit. at 25°C. Calculate the change in free energy of the process. (2)
5. Differentiate between anodic and cathodic coatings. (2)
6. Explain break point chlorination. (3)
7. Differentiate between thermoplastics and thermosetting resins. (3)
8. What are composites? What are their advantages? (2)
9. What is cracking? What is its significance? (3)
10. Calculate the minimum amount of air required for complete combustion of 1 kg of fuel containing: C = 90%, H = 3.5%, O = 3%, N = 1% and rest ash. (2)

PART – B (50 Marks)

- 11.(a) What is primary battery? Describe the construction and working of zinc-carbon battery with relevant reactions occurring during discharge. (6)
- (b) Discuss the principle involved in the potentiometric acid-base titrations. (4)
- 12.(a) What is isothermal process? Derive an equation for the work done in isothermal reversible process. (5)
- (b) Discuss the conditions of equilibrium and spontaneity in terms of free energy. (5)
- 13.(a) Explain electrochemical corrosion with mechanism. (6)
- (b) Describe the softening of water by ion-exchange method. (4)
- 14.(a) Write preparation, properties and uses of (i) PVC and (ii) butyl rubber. (6)
- (b) Define Homo, Hetero and copolymers with suitable examples. (4)
- 15.(a) What are the characteristics of a good propellant? (4)
- (b) What is calorific value of fuel? Describe the determination of calorific value of fuel by Bomb calorimeter. (6)
- 16.(a) What is a cyclic process? Describe the carnot cycle for establishing the maximum convertibility of heat into work. (6)
- (b) 2 Moles of an ideal gas expands reversibly and isothermally from a volume of 10 lit. to a volume of 20 lit at 27°C. Calculate the q, w, and ΔE for the process. (4)
- 17.(a) what is paint? What are its constituents and their functions? (6)
- (b) What is cetane number? What is its significance? (2)
- (c) Write any three applications of conducting polymers. (2)

FACULTY OF ENGINEERING
B.E. I-Year (Common to All) (Main) Examination, June 2013

Subject : Engineering graphics

Time : 3 Hours

Max. Marks: 100

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (35 Marks)

1. A room of 1000m³ volume is represented by a block of 125cm³ volume. Find R.F. (4)
- 2.(a) The top view of a point 'a' is 35mm above XY, the front view is 10mm below the top view. If so, the point 'a' is in _____ quadrant. (1)
- (b) The top view and front view are always in line _____ and the front view and side view are always in line _____ (vertically / horizontally). (2)
3. Draw the development of the frustum of a cone whose base diameter is 75mm, top diameter is 35mm, height is 40mm. (5)
4. What do you mean by curves of interpenetration? (4)
- 5.(a) an isometric view is _____ (1)
- (b) If the cylinders of same diameter intersect each other orthogonally, the resulting curves of intersection are _____. (1)
6. Define Epicycloid and Hypocycloid. (3)
7. A square plane ABCD of side 30mm is perpendicular to V.P. and inclined to H.P. at an angle of 40°. Draw its projections and find its traces. (5)
8. Differentiate between section, sectional top view and sectional front view. (3)
9. What data is required to construct a scale? (3)
10. Inscribe a hexagon in a circle of 50mm diameter. (3)

PART – B (65 Marks)

- 11.(a) A rectangular plot of land of area 16 sq.m is represented by a similar rectangle 1 sq. cm on a map. Find R.F. construct a scale to read meters from the map. The scale should be long enough to measure upto 100m. On the scale, indicate distances of 82m, 55m and 25m. (8)
- (b) Two points A and B are 100mm apart. A point 'C' is 75mm from A and 60mm from B. Draw an ellipse passing through A, B and C. (5)
- 12.(a) One end A of a straight line AB is 20mm above H.P. and 50mm before V.P. The other end B is 70mm above H.P. and 25mm before V.P. The distance between the end projectors of the line is 60mm. Draw the projectors of the line and find the length, true inclination with H.P. and V.P. and the traces of the line. (8)
- (b) Draw an epicycloid given the radii of rolling and directing circles as 30mm and 120mm respectively. Also draw a normal and a tangent at any point on the curve. (5)

FACULTY OF ENGINEERING & INFORMATICS

B.E. I Year (Main) Examination, June 2013

Subject: Mathematics – I

Time: 3 Hours

Max.Marks: 75

Note : Answer all questions from Part A. Answer any Five questions from Part B.**PART – A (25 Marks)**

1. If the rank of the matrix $A = \begin{pmatrix} 1 & 2 \\ a & 3 \end{pmatrix}$ is one, then find 'a'. (3)
2. Define (i) characteristic roots and (ii) characteristic vectors of a square matrix. (2)
3. Test the series $\sum \frac{4n^3 + 2}{7n^3 + 2n}$ for convergence. (3)
4. Show that the series $\sum \frac{\sin nx}{n^3}$ converges absolutely. (2)
5. Find the Taylor series of $f(x) = \sin x$ about $x = \pi/4$. (3)
6. Find the envelope of the family of curves $y = (x-p)^2$, where p is the parameter. (2)
7. If $z = e^{ax+by} f(ax-by)$, then prove that $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y} = 2abz$. (3)
8. Obtain the total differential of $z = \tan^{-1}(x/y)$, $(x,y) \neq (0,0)$. (2)
9. Evaluate $\int_1^2 \int_1^3 xy^2 dx dy$. (3)
10. Find a unit normal vector to the surface $xy^3z^2 = 4$ at the point $(-1, -1, 2)$. (2)

PART – B (50 Marks)

- 11.(a) Find the values of λ and μ such that the system $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=\mu$ has an infinite number of solutions. (5)
- (b) Show that the vectors $(1,3,4,2)$, $(3,-5,2,2)$ and $(2,-1,3,2)$ are linearly dependent. (5)
- 12.(a) Discuss the convergence of the geometric series $1+r+r^2+r^3+ \dots$. (5)
- (b) Test the series $\sum \frac{(n!)^2}{(2n)!} x^{2n}$ for convergence. (5)
- 13.(a) State and prove Lagrange mean value theorem. (5)
- (b) Find the evolute of $y^2 = 4ax$. (5)
- 14.(a) Trace the curve $y = x^3$. (5)
- (b) Show that the function $f(x,y) = \begin{cases} \frac{x^2 + y^2}{x - y}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$ is not continuous at $(0,0)$. (5)
- 15.(a) Find the directional derivative of $f(x,y,z) = xy^2 + 4xyz + z^2$ at $(1,2,3)$. (5)
- (b) Evaluate $\int_c [(xy+y^2)dx + x^2 dy]$, where c is bounded by $y=x$ and $y=x^2$. (5)
16. Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & 2 & 0 \\ -1 & 1 & 2 \\ 1 & 2 & 1 \end{pmatrix}$ and hence find A^{-1} . (10)
- 17.(a) Discuss the convergence of the series $\sum \left(1 + \frac{1}{n}\right)^{-n^2}$. (5)
- (b) If $\vec{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$, find $\text{div} \vec{F}$ and $\text{curl} \vec{F}$. (5)

..2..

13. A circular disc of dia. 40mm and negligible thickness rests on HP on its rim and makes an angle of 45° to it. One of its diameters is inclined to VP at 30° . Draw its projections keeping distance of the centre of the disc 40mm in front of the VP. (13)
14. A right regular pentagonal prism, side of base 30mm and height 75mm, rests on one of its base corners on HP such that its long edge containing the corner is inclined to the HP at 60° and the side of base, opposite the corner, inclined at 30° to VP. Draw its projections keeping the vertex towards the VP. (13)
15. A right regular rectangular pyramid of base 50 x 35 mm and height 70mm, rests on its base in HP with one of its base sides parallel to VP. A section plane perpendicular to the VP and inclined at 30° to the HP cuts the pyramid, bisecting its axis. Develop the lateral surface of the truncated pyramid. (13)
16. A cylinder, diameter of base 60mm and 90mm long, resting on its base in HP, is penetrated completely by another cylinder of the same dimensions such that axes are mutually perpendicular and symmetrical about one another. The axis of the penetrating cylinder is 9mm in front of the axis of the vertical cylinder and is parallel to both the H.P. and V.P. Draw the projection of the solids showing curves of intersection. (13)
17. Draw the Isometric projection of two solids. A sphere is placed centrally on the top of the truncated square pyramid of top face 30mm side and bottom face of 40mm side, when the height of the solid is 60mm. (13)

FACULTY OF ENGINEERING and INFORMATICS

B.E. I – Year (Common to All) (Main) Examination, June 2013

Subject : Engineering Mechanics

Time : 3 hours

Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. State the Triangular law for concurrent co-planar force system. (2)
2. Write the static equilibrium equations for non-concurrent co-planar force system. (2)
3. Define the angle of friction. (2)
4. State the parallel axis theorem. (3)
5. Derive the impulse momentum equation. (3)
6. State the PAPPUS's theorems. (3)
7. The motion of a particle is given by the equations (3)

$S = t^4 - 12t^2 - 40$, where s is displacement in meter and t is sec. Determine the acceleration of particle after 2 sec.
8. State D' Alembert's principle. (2)
9. Derive the mass moment of inertia for a rectangular plate with thickness t and density S . (3)
10. Derive the work-energy principle. (2)

PART – B (50 Marks)

- 11.a) The moment of a certain force 'F' is in clockwise about 'O' and 90N-m counter clockwise about B. If its moment about 'A' is zero. Determine the force. (5)

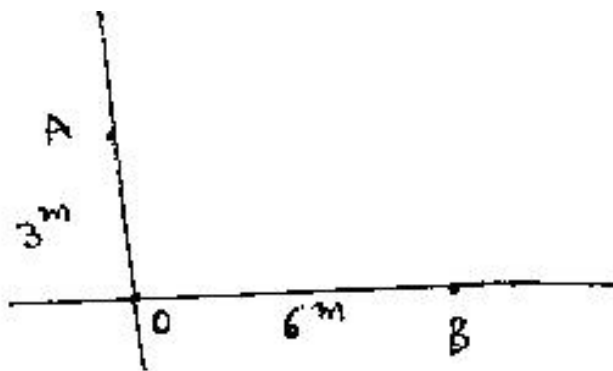


Fig-1