Code No. 5

FACULTY OF ENGINEERING

B.E. I-Year (Backlog) Examination, Dec, 2017

Subject : Engineering Chemistry

Time : 3 hours **Max. Marks : 75**

Note : Answer all questions from Part-A and any Five Questions from part-B

PART – A (25 Marks)

1. Calculate the electrode potential of $\underset{(s)}{Zn} \Big/ \underset{(0.01M)}{Zn^{2+}}$ electrode at 25^0 C. $\left(E^o_{Zn^{2+}/Zn} = -0.76V\right)$. (2)
2. Define cell constant. Draw the plot of weak acid vs strong base titration conductometrically and explain the plot. (3)
3. Explain Galvanic corrosion with a suitable example. (3)
4. Write a note on Break point Chlorination. (2)
5. Explain the applications of conducting polymers. (2)
6. Classify polymers and give one example each. (3)
7. Define i) HCV and ii) LCV. (2)
8. Write the characteristics of a good propellant. (3)
9. Write the phase rule equation and explain the terms in it. (2)
10. What are Nematic and Smectic liquid Crystals? Explain. (3)

PART – B (50 Marks)

11. a) Derive Nernst equation and write its applications. (5)
    b) Differentiate Primary and Secondary batteries . Explain Zinc-Ago battery. (5)

12. a) Explain the factors affecting the rate of corrosion. (5)
    b) Explain the reverse Osmosis method of water softening. (5)

13. a) Write a note on i) Buna-S and ii) Silicane rubbers. (5)
    b) Explain the composition and properties of composites. (5)

14. a) Explain proximate analysis of coal and its importance. (5)
    b) Discuss the concept of trans esterification and explain its significance. (5)

15. a) Classify lubricants and explain the properties of lubricants. (5)
    b) Explain Pattinson's Process of desilverisation of lead. (5)

16. a) What are reference electrodes? Give two examples and represent them and write their electrode reactions for reduction process. (5)
    b) What is Cathodic protection? Explain Sacrificial anode method of protecting corrosion. (5)

17. a) Write the preparation, properties and application of (5)
    i) Teflon ii) Perlon-U
    b) A gas with the following composition by volume; H_2 =32% ; CH_4=14%; N_2 = 40% ; O_2 =14% . If 25% excess air is used , find the weight of air actually supplied per m^3 of this gas. (5)

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Code No. 423

FACULTY OF ENGINEERING

B.E. (Bridge Course) II – Semester (Backlog) Examination, December 2017

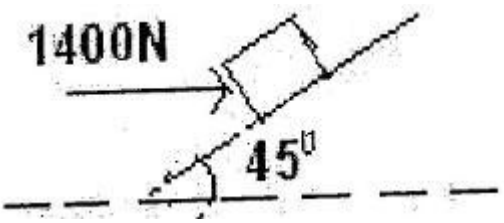
Subject: Engineering Mechanics

Time: 3 Hours **Max.Marks: 75**

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

PART – A (25 Marks)

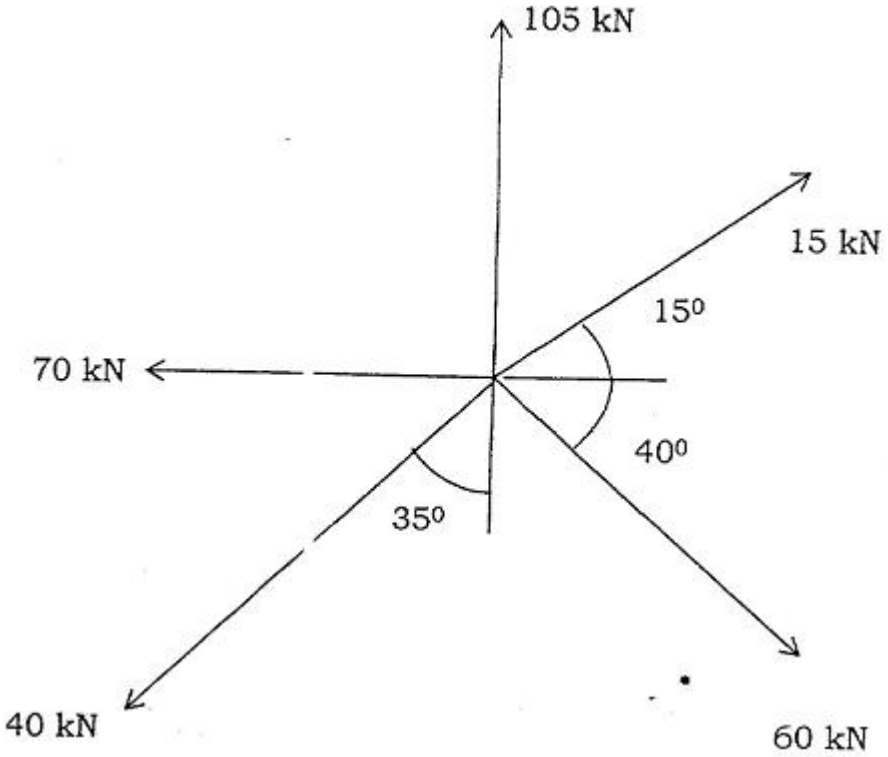
1	Define moment of a couple.	2
2	Explain the term 'Free Body Diagram' with two examples.	3
3	Write short note on cone of friction.	2
4	What will happen if a block of 950 N weight as shown below, is kept to be in equilibrium with force 1400 N when co-efficient of friction between the interface is 0.3.	3



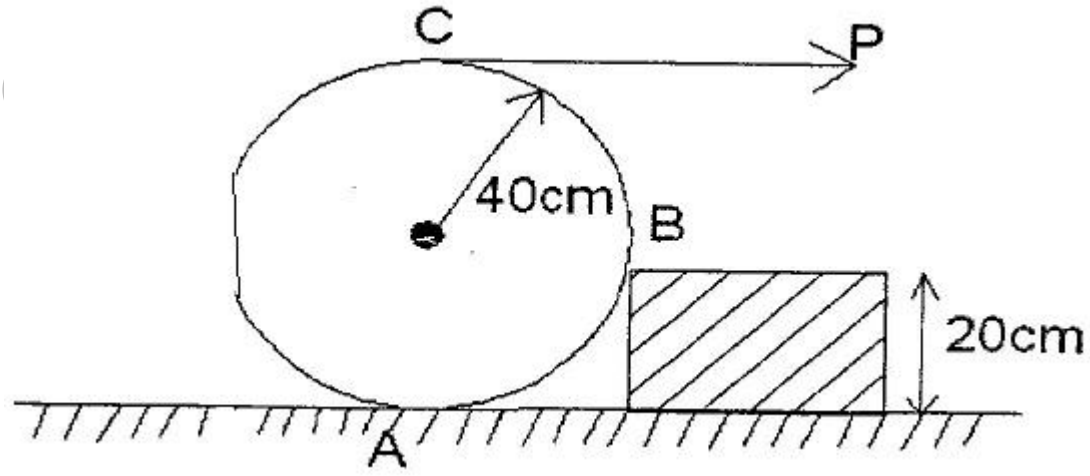
5	State the perpendicular axis theorem of MI.	2
6	The centroid of a triangular section of base 'b' and height 'h' from its base is _____.	3
7	State the D'Alembert's principle.	2
8	What is an Instantaneous centre? How can we locate it on a plane motion? Explain briefly with an example.	3
9	The kinetic energy of a rotating body depends on _____ and _____.	2
10	A spring is stretched by 60 mm by the application of a force. Find the work done, if the force required to stretch 1 mm of the spring is 10 N.	3

PART – B (5x10 = 50 Marks)

11 a) Determine the resultant of the concurrent forces shown below. 8



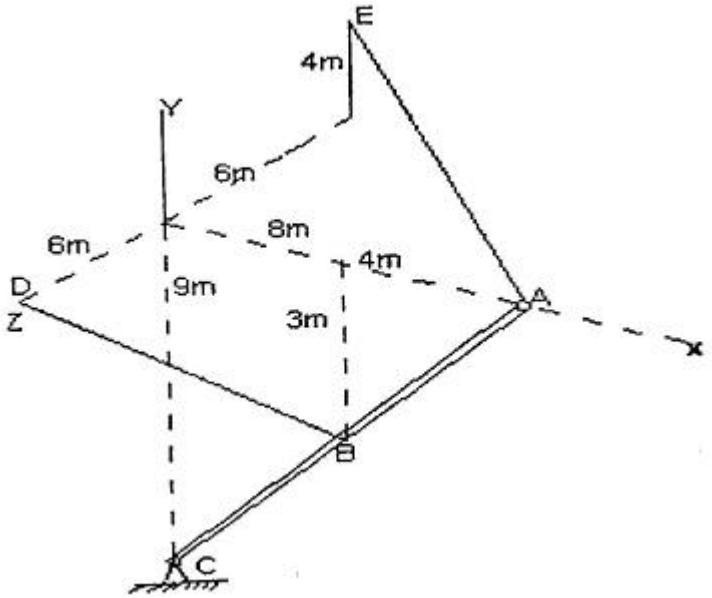
b) Find the least value of force P required to overcome an obstacle 20 cm high to a roller weighing 100 kN and 40 cm radius. Also, find the reaction at the block. 2



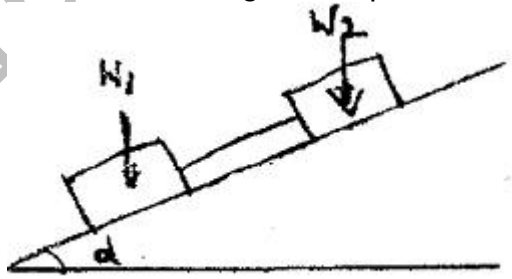
12 For the system shown in *figure below*, the force multiplier of P acting from A to E is Pm = 100 N/m. Determine the following: 5+5

a) Component of force P along AC

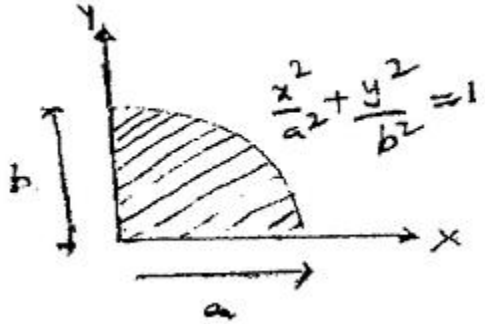
b) Moment of P about C.



13 Two blocks of weights W_1 and W_2 connected with a string rest on a rough incline as shown below. If the co-efficient of friction are 0.2 and 0.25 for the blocks respectively and $W_1 = W_2 = 75$ N, find the value of angle of slope 'a' for which sliding will impend. 10



14 a) Find the coordinates of centroid of a quarter ellipse shown below, using direct integration. 5



b) Determine the centre of gravity of a solid hemisphere of radius 'R', from its base circle. 5

15 a) Derive from first principles the moment of inertia of a right angled triangle about the base. 5

b) Calculate the product of inertia for a shaded area as shown in Fig. below, with respect to given x – y axis. 5

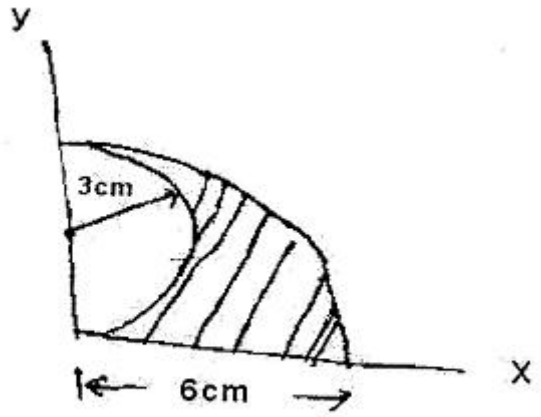
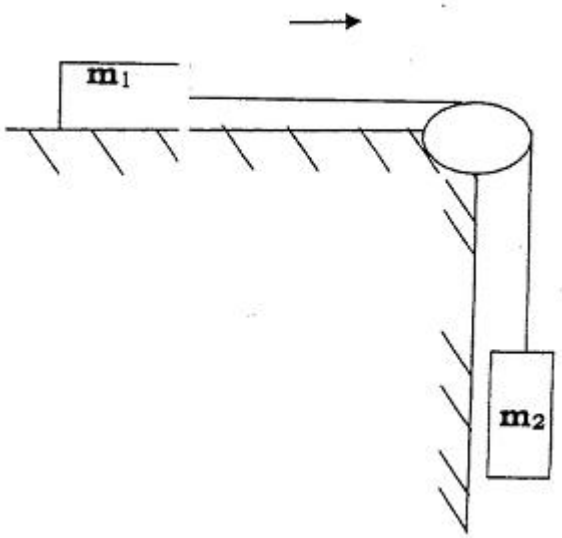


Fig-5

16 Two masses (m_1 = 30 kig, m_2 = 15 kg) are interconnected with an inextensible cord as shown in fig. below. Considering coefficient of friction in contact surfaces as 0.3, determine the acceleration and tension of the string. 10



17 Write short notes on the following:

a) SHM 3

b) Work Energy Equations 3

c) Types of motions in dynamics. 4

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Code No. 10

FACULTY OF ENGINEERING

B.E. I- Semester (Main & Backlog) Examination, Dec, 2017

Subject : Engineering Physics

Time : 3 hours **Max. Marks : 70**

Note : Answer all questions from Part-A and any Five Questions from part-B

PART – A (10x2=20 Marks)

1. What is interference of light? Describe the ways of obtaining coherent sources.
2. Distinguish between Fresnel and Fraunhoffer diffraction.
3. What is optical activity? Define specific rotation of an optically active material.
4. What is population inversion? How would it be achieved?
5. Distinguish between step index and graded index fibres.
6. What is piezoelectric effect?
7. Explain the terms phase space and phase point.
8. State Maxwell-Boltzmann distribution law. Give its mathematical expression.
9. Find the lowest energy of an electron confined to move in a one dimensional box of length $1A^0$, in electron volts.
10. State Ampere's law in integral and differential forms.

PART – B(50 Marks)

11. a) Explain the formation of Newton's rings in reflected light. Obtain an expression for the wavelength of a given monochromatic light. [6]
    b) In Newton's rings experiment the diameter of 10^{th} ring changes from 1.4 cm to 1.2 cm when a liquid is introduced between the lens and glass plate. Calculate the refractive index of the liquid. [4]
12. a) What are Einstein's coefficients and obtain the relation between them. [5]
    b) Describe the construction and working of ruby laser. [5]
13. a) What is piezoelectric effect? Explain the production of ultrasonic waves using piezoelectric effect with neat circuit diagram. [7]
    b) Mention few applications of ultrasonic waves. [3]
14. a) Explain the distinguish features of MB, BE and FD statistics. [3]
    b) Derive the expression for Fermi-Dirac distribution law. [7]
15. a) Write the properties of wave function. [3]
    b) Apply Schrödinger's wave equation for a particle in an infinite potential well and discuss its wave functions and energy levels. [7]
16. a) Describe the fundamental laws of electricity and magnetism. [4]
    b) State and explain Poynting theorem for the flow of energy in electromagnetic waves. [6]
17. a) A monochromatic light of wavelength $6100x10^{-8}$ cm is incident normally on a 1.8 cm wide grating. The first order spectrum is produced at an angle of 18^0 with respect to the normal. Calculate the total number of lines on the grating. [6]
    b) Discuss the propagation of light in single mode, multimode and graded index fibers.

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