FACULTY OF TECHNOLOGY

B.Tech. 3/4 (Chem. Engg.) II – Semester (Backlog) Examination, June 2018

Subject: Mass Transfer Operations – I

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

Note: Answer all questions. All questions carry equal marks.
Humidity charts and steam tables may be permitted to use.

1 a) i) What are mass transfer operations? Explain in detail.   [6]

   ii) Oxygen is diffusing through carbon monoxide under steady-state with carbon monoxide non-diffusing. The temperature and total pressure of the system are respectively 273K and 101.3x10^3 N/M^2. The partial pressures of the oxygen at two planes 2mm apart are 14000 N/M^2 and 9000 N/M^2. Determine the rate of diffusion of oxygen through M^2 of two planes. The D_{AB} is 1.39x10^{-5} m^2/s.   [8]

<div align="center">OR</div>

   b) i) Explain:

      a) Higbie theory

      b) Dobbins theory   [4]

   ii) What are mass transfer co-efficients? Derive the relations between the film transfer co-efficients with general mass transfer co-efficients for $N_A = -N_B$.   [10]

2 a) Derive the relation $\dfrac{1}{K_y} = \dfrac{1}{k_y} + \dfrac{M^1}{k_a}$ (notations have usual meaning).   [14]

<div align="center">OR</div>

   b) Give the various points to be taken in to consideration for selecting packed towers.   [14]

3 a) i) What should be the factors to be considered for selecting random and regular packings.   [4]

   ii) Give the design procedure to calculate the number of transfer units for the counter current packed towers.   [10]

<div align="center">OR</div>

   b) i) Give the design procedure to calculate the number of ideal trays in an counter current absorption tray tower.   [10]

   ii) What is satisfactory area? Explain in detail with respect to liquid flow rate to gas flow rate in tray absorption tower.   [4]

4 a) i) Explain the terms:

     I)   Wet bulb temperature

     II) Dry bulb temperature

     III) Adiabatic saturation temperature   [6]

    ii) Estimate the following using the humidity charts for vapor-gas mixture with dry bulb temperature of 60°C and wet bulb temperature of 40°C.

     I)   Absolute humidity

     II) Dew point temperature

     III) Molal humidity   [8]

OR

  b) Give in detail the procedure to get the wet bulb depression stating assumptions.   [14]

5 a) i) Explain the terms:

     I)   Bound moisture

     II) Unbound moisture

     III) Free moisture   [7]

    ii) Explain the construction and working principle of vacuum shelf tray dryer with a neat diagram.   [7]

OR

  b) Explain the construction and working principle of atleast two crystallizers used in chemical industry with a neat diagram.   [14]

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FACULTY OF ENGINEERING

B.E. I-Year (Backlog) Examination, May / June 2018

Subject: Engineering Chemistry

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

Note: Answer All Questions From Part – A, & any FIVE Questions From Part – B.
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PART-A (25 Marks)

1. Define standard electrode potential. Find the EMF of the following cell: $Zn / Zn^{2+}(1M) // Cu^{2+}_{(1M)} / Cu$ given $E^0(Zn^{2+}/Zn) = -0.76V$ & $E^0(Cu^{2+}/Cu) = 0.34V$.   3

2. Differentiate between primary and secondary batteries   3

3. What is reverse osmosis?   3

4. What is paint? What are the main constituents of paint?   3

5. Differentiate between homapolymer and co – polymer.   2

6. Define a composite material   2

7. Write the applications of conducting polymers.   2

8. Distinguish between Gross and Net calorific Value of a fuel.   3

9. What is trans – esterification?   2

10. State Phase Rule.   2

PART-B (50 Marks)

11. a) What are reference electrodes? Describe the construction of Calomel electrode.   6
    b) Describe the Ni-Cd battery with charging and discharging reactions.   4

12. a) What is corrosion? Explain the factors effecting the rate of corrosion.   5
    b) 50ml of a sample water consumed 15 ml of 0.01M EDTA before boiling and 5 ml. of the same EDTA after boiling. Calculate the total, permanent and temporary hardness.   5

13. a) Distinguish between thermoplastic and thermo- setting polymers.   4
    b) Describe the method of preparation, properties and applications of the following: (i) Bakelite   (ii) Buna - S   6

14. a) Explain the determination of calorific value of gaseous fuel by Junker's calorimeter   6
    b) Explain the proximate analysis of coal What is its significance?   4

15. a) What is lubrication? Explain the mechanism of hydrodynamic lubrication   5
    b) Explain Pb-Ag system on the basis of phase-rule.   5

16. a) Write a note on conducto metric titrations.   6
    b) Explain the principles of green chemistry   4

17. a) Differentiate between low temperature and high temperature carbonization of coal.   3
    b) Write a note on
    (i) Liquid crystals   (ii) Lithium ion cells   (iii) Acid Value   7

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FACULTY OF ENGINEERING & TECHNOLOGY

B.E/B.Tech (Bridge Course) II- Semester (Backlog) Examination, May / June 2018

Subject: Engineering Mechanics

TIME: 3 HOURS   MAX. MARKS: 75

Note: Answer All Questions From Part-A, & Any Five Questions From Part-B.

Part-A(25 Marks)

1. What are the characteristics of force?   (3)
2. State lami's theorem.   (2)
3. Differentiate centroid and center of gravity.   (2)
4. State Pappus I & II theorems.   (3)
5. Define coefficient of friction and angle of friction   (3)
6. What is moment of inertia?   (2)
7. State parallel axis theorem.   (2)
8. Define D'Alermbert's principle.   (3)
9. Write work energy equation for translation.   (2)
10. What is free vibration?   (3)

Part-B (50 Marks)

11. a) Explain the equations of equilibrium of planar systems   (5)

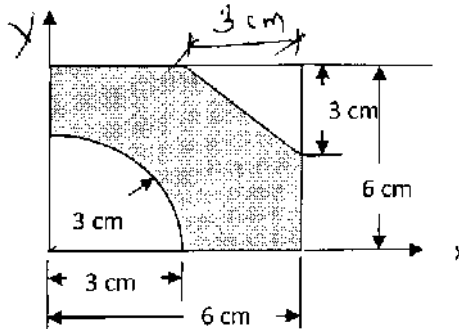   b) Determine the support reaction for the beam as shown in fig below.   (5)
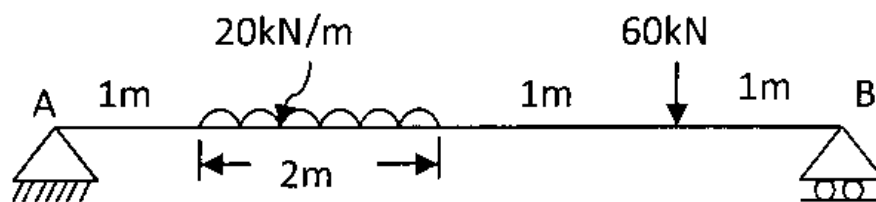
12. In the fig, a vertical boom AE is supported by wires from A to B, C and D. If the tensile load in AD =252N, find the forces in AC and AB. So that the resultant force on "A" will be vertical.   (10)
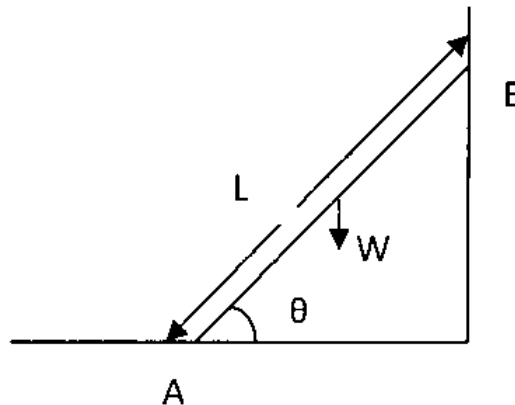

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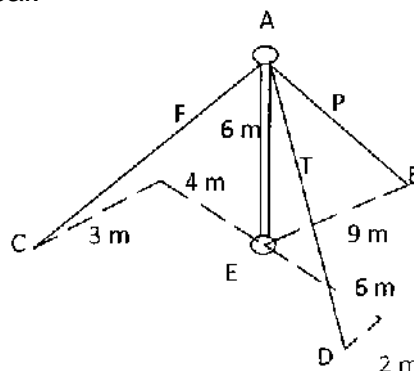
13. Find the centroid of shaded area. (10)

14. A uniform ladder of length L, and weight W is placed with one end on the ground and the other end against the vertical wall. The angle of friction at all contact surfaces is 20°. Find the minimum angle " " at which the ladder can be inclined with horizontal. (10)

15. For the I section shown in fig, are find the moment of inertia about the centroidal axis. (10)
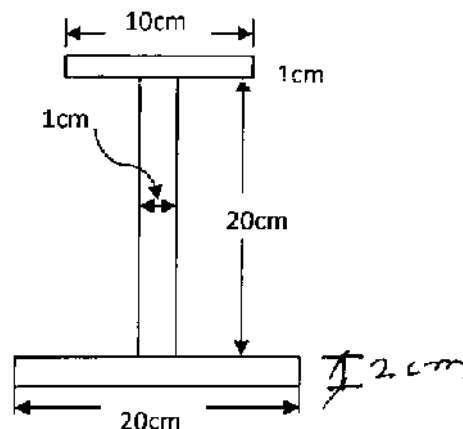
16. a) Explain the types of rigid body motion with equations. (5)
    b) A stone is dropped into a well is heard to strike the water after 4 sec Determine the depth of the well if the velocity of sound is 350m/s. (5)

17 a) A train whose weight is 25 k N moves at the rate of 65km/h. After brakes are applied, it is brought to rest in 500m.Find the force exerted, assuming it to uniform. (5)
   b) Explain the simple harmonic motion with a neat sketch (5)

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FACULTY OF ENGINEERING

B.E. I – Semester(CBCS) (Supple.) Examination, May/June 2018
Subject: Engineering Physics – I

Time: 3 Hours   Max. Marks: 70

Note: Answer all questions from Part A & Five questions from Part B.

PART – A (20 Marks)

1) Two independent sources of light of same frequency and wavelength cannot produce interference why?

2) A parallel beam of sodium light is allowed to be incident normally on a plane grating having 4250 lines/cm and a second order spectral line is observed to be derivated through 30^0. Calculate the wavelength of spectral line.

3) What do you mean by double refraction?

4) List some of the applications of laser

5) Define acceptance angle.

6) Mention the properties of Ultra sonics

7) Explain about micro canonical ensemble.

8) What is de-Broglie Wavelength of an electron, which has been accelerated from rest through a potential difference of 100v?

9) Write the mathematical expressions for Wein's law and Reyleigh-jeans law.

10) Write the Maxwell's equations in differential form.

PART – B (50 Marks)

11. a) Derive an expression for interference in thin films due to reflection of light
    b) Obtain the condition for obtaining the principal maxima and minima for Fraunhoffer diffraction at single slit.

12. a) State and explain Malus law
    b) Explain the construction and working of He-Ne laser. Mention the merits of this laser.

13. a) Explain the method of producing ultrasonics by piezo electric method.
    b) With the help of neat diagram, describe the fiber drawing process.

14. a) Derive an expression for the Planck's black body radiation law.
    b) Deduce an expression for Maxwell-Boltzmann statistics.

15. a) Derive an expression for Schrodinger time – independent Wave Equations.
    b) List the properties of Wave function.

16. a) Describe the construction and Reconstruction of a hologram with the help of neat sketches.
    b) Prove that the diameter of the nth dark ring in a Newton's Rings experiment in directly proportional to the square root of the ring number.

17. a) What is numerical aperture? Derive an expression for numerical aperture.
    b) State and explain Poynting theorem.

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