

FACULTY OF ENGINEERING

B.E. I-Year (Backlog) Examination, November / December 2018

Subject: Engineering Chemistry

Time: 3 Hours

Max. Marks: 75

Note: Answer All Questions From Part – A, & any FIVE Questions From Part – B.

PART-A (25 Marks)

1. Define (i) single electrode potential and (ii) Standard electrode potential 2
2. Construct the electrochemical cell to find out the end point in potentiometric titration when Fe^{2+} ion is titrated against $KMnO_4$ Solution and draw the model graph. 3
3. Explain waterline corrosion. 3
4. Write the constituents of Paints. 2
5. Define condensation polymerization and Co-polymerization and give one example each. 3
6. Explain the mechanism of conduction in polyacetylene. 2
7. What are the requirements of a good fuel? Explain 3
8. Define the terms (i) Cracking and (ii) knocking. 2
9. Classify lubricants and give one example each. 3
10. Define the terms (i) Components and (ii) degrees of freedom. 2

PART-B (50 Marks)

11. a) Construct a cell for the reaction

$$Fe + Ni^{2+} \rightarrow Fe^{2+} + Ni$$

(a=1) (a=1)

 Calculate the e.m.f. of the cell at 298K from the following standard oxidation potential data :

$$E_{Fe/Fe^{2+}}^{\circ} = 0.440V; E_{Ni/Ni^{2+}}^{\circ} = -0.250V$$
 Is the cell reaction spontaneous? Give reasons. 5
 b) Construct Methanol – Oxygen fuel cell and explain its reactions and mention the applications. 5
12. a) Define metallic corrosion. Explain electrochemical theory of corrosion. 5
 b) How is boiler – feed water softened by ion-exchange method? Explain. 5
13. a) Give a descriptive account of the preparation, properties and uses of Bakelite. 5
 b) What are fiber reinforced composites? What are their advantages? Explain their applications. 5
14. a) Define octane number. What are the structural factors that promote its high value? Explain. 5
 b) A sample of coal was found to contain the following : C = 80%; H = 5%; O=1%; N=2% remaining being ash.
 Calculate the amount of minimum air required for complete combustion of 1 kg of coal sample. 5

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15. a) Write short notes on (i) Viscosity index (ii) saponification Value and (iii) Iodine value. 5
b) What is triple point? Explain the phase diagram of water system. 5
16. a) Represent the following electrodes and write their reactions for redox process and mention their S.R.P. Values. 5
(i) Saturated calomel electrode and (ii) Quinhydrone electrode
b) What is the principle of EDTA titration? Briefly explain the estimation of hardness of water by EDTA method. 5
17. a) What is latex? How is natural rubber isolated from it? What is Vulcanization? How does it improve the property of natural rubber? 6
b) Explain the principles of green chemistry. 4

FACULTY OF ENGINEERING & TECHNOLOGY

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

Subject: Engineering Mechanics

TIME: 3 HOURS

MAX. MARKS: 75

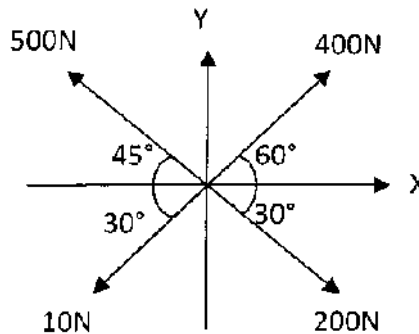
Note: Answer All Questions From Part-A & Any Five Questions From Part-B.

Part-A (25 Marks)

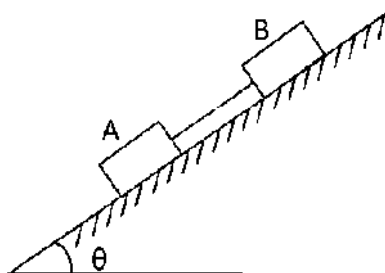
1. State the principle of transmissibility. (2)
2. Define varignon's theorem. (3)
3. Define free body diagram. Illustrate with two examples. (3)
4. What is Radius of gyration? (2)
5. State the laws of friction. (3)
6. Define polar moment of inertia. (2)
7. Differentiate between kinematics and kinetics. (3)
8. State D'Alembert's principle. (2)
9. A body of weight 400N is moving with velocity of 60m/s. What will be kinetic energy of the body? (3)
10. What is forced vibration? (2)

Part-B (50 Marks)

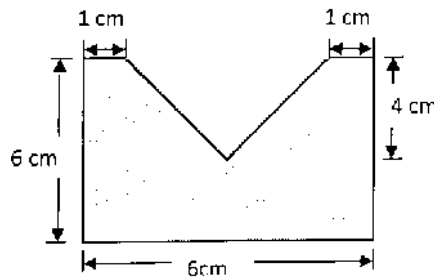
11. Determine the resultant of the coplanar concurrent force system shown in fig. given below. (10)



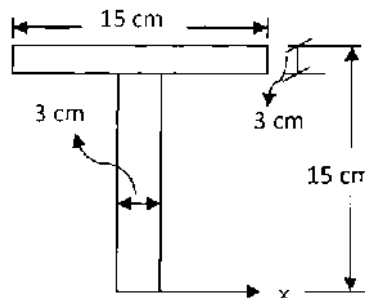
12. Bodies A and B are joined by a cord parallel to the inclined plane as shown in fig. Under body A which weights 200N, $\mu = 0.2$, while $\mu = 0.5$ under body B, which weight 300 N. Determine the angle at which motion impends. (10)



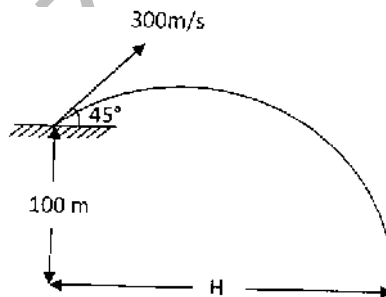
13. Determine the centroid of the shaded area as shown in fig below. (10)



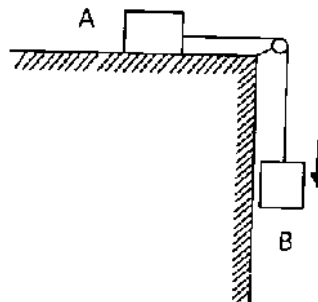
14. For the T section shown in fig, determine the moment of inertia about centroidal axis. (10)



15. A projectile is fired from the top of a cliff of 100m high with a velocity of 300m/s at an angle of 45° to the horizontal. Calculate the horizontal range of the projectile from the base of the cliff. (10)



16. Two blocks A = 200N and B = 100N are connected by a string as shown in fig below. If the system is released from rest and the block B falls through a vertical distance of 1m. What is the velocity acquired by it and also by block A. Take $\mu = 0.25$ between the block A and the plane. (10)



17. (a) Differentiate between simple pendulum and compound pendulum. (3)
 (b) A simple harmonic motion is defined by the relation $a = -36 s$. Determine its period and frequency.