

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL - 2021**

APPLIED SCIENCE – I (PHYSICS)

[Maximum Marks: 50]

[Time: 1 ½ Hours]

PART-A

[Maximum Marks: 4]

(Answer *all* questions in one or two sentences. Each question carries 2 marks)

- I. 1. What are nano and femto.
2. State Hooke's Law. (2 x 2 = 4)

PART-B

[Maximum Marks: 16]

(Answer any *two* full questions. Each question carries 8 marks)

- II 1. What does banking of curved tracks mean? Explain the theory behind banking. (4)
2. Derive kinetic energy of a disc rolling on a horizontal surface. (4)
- III 1. State and explain parallel and perpendicular axes theorem. (4)
2. Define torque and angular momentum and give the relation between them. (4)
- IV 1. What is impulse. Calculate the impulse required to stop a car of mass 2200 kg moving with speed of 30 m/s. (4)
2. Explain Young's Modulus, Bulk Modulus and Rigidity Modulus of a material. (4)

PART-C

[Maximum Marks: 30]

(Answer *one* full question from each Unit. Each full question carries 15 marks)

UNIT -I

- V (a) Derive an expression for the maximum height of a projectile. "When the horizontal range is maximum, largest height attained by a projectile is one fourth of the maximum range". Justify. (6)
- (b) Obtain an expression for maximum range for a body projected with a velocity 'u'. What will be its maximum range when the velocity is doubled. (6)
- (c) State Newton's second law of motion and derive the equation for force. (3)

OR

- VI (a) Write any three methods to reduce friction. (3)
- (b) A body moving with uniform acceleration describes 12 m in the 2nd and 24 m in the fourth second of its motion. Calculate the distance moved by it in the fifth second. (6)
- (c) Derive an expression for the Horizontal range (R) and time of flight (T) for a projective motion. (6)

UNIT -II

- VII (a) Explain the terms elastic limit, elastic fatigue. (4)
- (b) A circular disc of mass 250kg and diameter 3m rotates with an angular velocity of 80rpm. When a torque is applied, its velocity is reduced to 50 rpm in 25s. Find the value of the torque. (6)
- (c) If the radius of the earth becomes 97% of its original value; mass remaining the same, what is the new value of acceleration due to gravity. ($g = 9.8 \text{ m/s}^2$). (5)

OR

- VIII (a) Distinguish between 'g' and 'G'. (3)
- (b) Derive an expression for the moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane. (6)
- (c) The diameter of a brass rod is 6mm. What force in newton will stretch by 0.2% of its length? [$Y = 9 \times 10^{10} \text{ Nm}^{-2}$]. (6)

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**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/
COMMERCIAL PRACTICE, APRIL - 2021**

APPLIED SCIENCE-I (CHEMISTRY)

[Maximum marks: 50]

(Time: 1 ½ Hours)

PART – A

[Maximum marks: 4]

(Answer the following questions in one or two sentences. Each question carries 2 marks)

I. (1). What are radicals? Give one example.

(2) Define Nanochemistry

(2 x 2 = 4)

PART – B

[Maximum marks: 16]

(Answer any **two full** questions. Each question carries 8 marks)

II.(a). What is meant by sterilization of water. Explain the chemical changes involved in the sterilization of water by bleaching powder. (4)

(b). List any four properties carbon nanotubes. (4)

III. (a). 20ml of sodium hydroxide solution was neutralized by 25ml of an acid of normality

0.11. Find the normality of the base. (4)

(b). Explain acidic buffer and basic buffer with one example each. (4)

IV. (a). Write down the molecular formula of the following compounds. (i) Ammonium chloride

(ii) Calcium sulphate (iii) Potassium chloride (iv) Sodium carbonate (4)

(b). Explain Lewis concept of acids and bases with one example each. (4)

(2 x 8 = 16)

PART – C

[Maximum marks: 30]

(Answer **one full** question from each unit. Each question carries 15 marks)

UNIT –I

V.(a). Calculate the molecular weight of the following compounds: (i) H₂SO₄ (ii) Na₂CO₃

(iii) KMnO₄ (iv) Ca(OH)₂ [S=32, Na=23, Mn=55, K=39, Ca=40] (4)

(b). Define ionic product of water, Give its mathematical expression. (4)

(c). Explain Arrhenius concept of acid and bases with one example for each. (4)

(d). Calculate pH of .005M H₂SO₄ solution. (3)

OR

VI.(a).Concentration of hydrogen ion in a cup of black coffee is 10⁻⁶M/L. Find the pH of the coffee. Is the coffee acidic or alkaline. (4)

(b). Balance the following equations:

(i) $\text{KMnO}_4 + \text{HCl} \rightarrow \text{KCl} + \text{MnCl}_2 + \text{H}_2\text{O} + \text{Cl}_2$ (ii) $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ (4)

(c). Differentiate between strong acid and weak acid with one example for each. (4)

(d). Write any three differences between atom and molecule. (3)

UNIT-II

VII. (a). What are carbon nanotubes and mention different varieties. (4)

(b). Explain the steps in the production of potable water for municipal supply. (4)

(c). Differentiate between soft water and hard water. (3)

(d). Explain ion exchange method. (4)

OR

VIII. (a). Explain chemical vapour deposition method for the synthesis of carbon nanotubes. (3)

(b). List any four applications of carbon nanotubes. (4)

(c). Explain the disadvantages of hard water. (4)

(d). What are the characteristics of potable water. (4)
