

Patuakhali Science and Technology University
 Dept. of Physics and Mechanical Engineering
 Class Test of B.Sc. Engg. (CSE) Level-I, Semester-II, Session-2017-2018
 Course Code: PHY 121, Course Title-Physics-II
 Full Marks-15, Time Duration-35 minutes

1. Verify the difference between isotropic and anisotropic medium. Show that for a homogeneous isotropic medium $y = 2\eta(1 + \sigma)$, where letters have their usual meaning. 1+4
2. For streamline and turbulent flow of a liquid discuss the significance of Reynold's number. Write the approximate value of Reynold's number in a pure numerical system of units. 2+0.5
3. a) Why and how two types of beta decay occur? Show the status of nucleus before and after the decay with proper mathematical representation. 1.5+1.5
 b) Convert 1 a.m.u. into MeV. 1.5
4. Define: i) Lattice ii) Basis iii) Crystal 1+1+1

Patuakhali Science and Technology University

Mid Term Examination-2017

Course Code: CIT-121; Course Title: Discrete Mathematics

Full Time: 30 minutes

Full Marks: 15

1. Draw the difference between Continuous Mathematics and Discrete Mathematics. 2
2. Illustrate DeMorgan's Law $(A \cup B)^c = A^c \cap B^c$ using Venn diagrams. 3
3. Briefly describe types of Relation. 5
4. Let $A = \{a, b, c\}$, $B = \{x, y, z\}$, $C = \{r, s, t\}$. Let $f: A \rightarrow B$ and $g: B \rightarrow C$ be defined by: $f = \{(a, y), (b, x), (c, y)\}$ and $g = \{(x, s), (y, t), (z, r)\}$. Find the composition function $g \circ f: A \rightarrow C$. 5

Patuakhali Science and Technology University

2nd Semester (L-1, S-2) Final Examination of B.Sc. (Engg.) in CSE, July-December: 2019, Session: 2018-2019

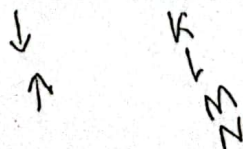
Course Code: PHY 121, Course Title: Physics-II

Credit Hour: 3.0, Full Marks: 70, Total Time: 3 Hours

[Figures in the right margin indicate full marks. Split answering of any question is not recommended.]

Answer any five (05) from the following questions

1. (a) Define the terms neutral surface and bending moment. 2
- (b) If a thin light beam clamped horizontally at one end and loaded at the other, then how can we determine the depression of the beam? 4
- (c) Deduce an expression for the couple required to twist a uniform solid cylinder by an angle. 5
- (d) What couple must be applied to a wire 1 meter long, 1 mm in diameter in order to twist one end of it, through 90° , the other end remaining fixed. Rigidity of material of the wire is $2.8 \times 10^{10} \text{ Nm}^{-2}$. 3
2. (a) Explain clearly from where the energy comes when the liquid rises against gravity in the capillary tube and the liquid meniscus is plane, concave or convex. Why? 3
- (b) Apply the capillary action and find the expression for the height h to which a liquid of surface tension T may rise in a capillary tube of radius r . 5
- (c) What is equation of continuity? Derive an expression for the equation of continuity. 4
- (d) Using Poiseuille's equations, how can you describe the several mechanism of blood flow in our body? 2
3. (a) Discuss briefly the idea of critical velocity and explain the significance of the Reynold's number. 3
- (b) According to Bernoulli's theorem, show that for a liquid in streamline motion is $\frac{p}{\rho} + gh + \frac{v^2}{2} = \text{constant}$, where the symbols have their conventional meanings. 3
- (c) What are Bravais lattices? Describe the different types of crystal systems, along with their characteristics. 4
- (d) Prescribe packing fraction. Derive expressions for the packing fractions of a s.c and b.c.c crystal structure. 4
4. (a) What do you understand by characteristic x-rays? How would you identify the characteristic x-rays whether it is emitted from K-shell or M-shell of an atom? 4



Please Turn Over

- (b) What is LASER? Define stimulated absorption and spontaneous emission of a photon. 3
- (c) Write down the mechanism of LASER. Give the practical applications of LASER. 4
- (d) Estimate the energy and wavelength of the characteristic x-ray emitted from a tungsten target when an electron drops from an M shell ($n=3$ state) to a vacancy in the K shell ($n=1$ state). 3

5. (a) Define (i) Interference, (ii) Diffraction, and (iii) Polarization of light. 3
- (b) Explain polarization of light by selective absorption, and hence the Malus's law. 4
- (c) State and explain the Brewster's law. 4
- (d) The polarizers are rotated so that the second polarizer has a transmission axis of 40.0° with respect to the first polarizer and the third polarizer has an angle of 90.0° with respect to the first. If I_0 is the intensity of the original unpolarized light, what is the intensity of the beam after it passes through (i) the second polarizer, and (ii) the third polarizer?, and (iii) What is the final transmitted intensity if the second polarizer is removed? 3

6. (a) What is meant by radioactive decay? Identify that it is a random process. 3
- (b) Show that the number of radioactive nuclei is given as a function of time by 5

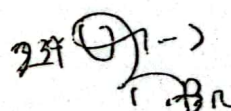
$$N = N_0 e^{-\lambda t}, \text{ where the symbols have their conventional meanings.}$$

- (c) Identify the two types of beta particles and how they produce? 2
- (d) Of the 600 mg of potassium in a large banana, 0.0117 % is radioactive ^{40}K , which has a half-life $T_{1/2}$ of 1.25×10^9 year. What is the activity of the banana? 4

7. (a) What is fission reactions? How does fission reactions occurs. 2
- (b) Define prompt neutrons, and delayed neutrons. 2
- (c) What is nuclear reactors? Write down the types of nuclear reactors. Briefly discuss the boiling water reactor with schematic diagram. 7
- (d) A 200 MW fission reactor consumes half its fuel in 3.00 y. How much ^{235}U did it contain initially? Assume that all the energy generated arises from the fission of ^{235}U and that this nuclide is consumed only by the fission process. 3

$$\frac{28}{14} \frac{92}{92}$$

$$\frac{\ln 2}{T_1}$$



Patuakhali Science and Technology University
Dept. of Physics and Mechanical Engineering
Class Test of B.Sc. Engg. (CSE) Level-I, Semester-II, Session-2017-2018
Course Code: PHY 122, Course Title-Physics-II (Sessional)
Full Marks-15, Time Duration-30 minutes

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| 1. What would be the work done to increase the radius of a soap bubble from 6cm to 9cm, by blowing? ($T=25$ dynes/cm) | 4 |
| 2. Differentiate between Nuclear Fission and Nuclear Fusion. | 5 |
| 3. Draw Miller planes for the following indices: (003); (102); (010). | 6 |

Patuakhali Science and Technology University
Mid Term Examination-2018

Course Code: CIT-121; Course Title: Discrete Mathematics

Full Time: 20 minutes

Full Marks: 15

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| 1. Describe various types of set. | 5 |
| 2. Differentiate between function and relation. Explain One-to-one function, Onto function and Inverse of a Function with example. | 5 |
| 3. Illustrate DeMorgan's law $(A \cup B)^c = A^c \cap B^c$ using Venn diagram. | 5 |

Patuakhali Science and Technology University

B.Sc. Engg. (CSE) Level-I Semester-II Final Examination-2017(July-December), Session: 2016-2017

Course Code: PHY 121

Course Title: Physics-II

Credit Hour: 3.0

Full Marks: 70

Time: 3 hours

[Answer any 5(five) of the following questions. Numbers on the right margin indicate full marks.]

1. (a) Distinguish between angle of twist and angle of shear. 1+
 (b) Prove that the couple required per unit twist in the case of a cylinder is $C = \pi n a^4 / 2l$. 2+
 (c) Conclude as such medium which have the same properties at all points and in all directions with examples. 3+
 (d) For the case of modulus of rigidity, show that a shear is equivalent to an elongation and an equal compression at right angles to each other. 3+

2. (a) How is the surface tension of a liquid explained on the basis of intermolecular forces? 1+
 (b) Prove that the surface energy per unit area of a surface is numerically equal to the surface tension. $\epsilon = T$ 2+
 (c) Show that the excess pressure acting on the curved surface of a curved membrane is given by $P = 2T(\frac{1}{r_1} + \frac{1}{r_2})$, where r_1 and r_2 are the radii of curvature and T is the surface tension of the membrane. 3+

3. (a) In a fluid mechanics write down the importance of the equation of continuity. 1+
 (b) Discuss briefly the idea of critical velocity and explain the significance of the Reynold's number. 2+
 (c) Define mass flow rate and discharge (Q). If you know the mass flow is 1.5 kg/s, how long will it take to fill a container with 8 kg of fluid? 3+
 (d) How can we determine the various mechanism of blood flow in our body using Poiseuill's equation? 3+

4. $2e^{12}/n^3$
 (a) State and explain the radioactive decay law. 1+
 (b) Establish a relation between half-life and radioactive disintegration constant. 2+
 (c) Sketch the curve of the binding energy per nucleon versus mass number. Qualitatively show that there is a possibility of release of energy on fusion of light elements and fission of heavy elements. 2+

5. (a) Sketch the different series in the hydrogen spectrum and discuss the various characteristics on the basis of Bohr's theory. 3+
 (b) The wavelength of the second line of the Balmer series in the hydrogen spectrum is 4861 \AA . Calculate the wavelength of the first line. 3+
 (c) Show that for very large quantum number with frequency of rotation of electron and frequency of radiation emitted when the quantum number changes by unity approaches to the same value. 3+

6. (a) Discuss the conditions to be satisfied by the waves to interfere with each other. 2
 (b) Describe Young's experiment and derive an expression for (i) intensity at a point on the screen, (ii) fringe width. 3+3
 (c) Two coherent sources of light being 0.23 mm apart are contributing to make an interference pattern on a screen which is 45cm away from them. The wavelength of the emitted light by the sources is 275 \AA . On the screen, what would be the order of the bright fringe that is found 0.16 mm away from the central bright fringe? 3
 (d) Write short notes on any two of the following topics: 3
 i) Polarization by selective absorption; ii) Polarization by refraction

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Patuakhali Science And Technology University

B.Sc. Engg. (CSF) Level-I Semester- II Final Examination-2015 (July-December), Session: 2014-15

Course Code: PHY 121

Course Title: Physics-II

Credit Hour: 3.0

Full Marks: 70

Time: 3 hours

[Answer any Five of the following questions. Numbers on the right margin indicate full marks.]

1. (a) Derive an expression for the energy of hydrogen atom when the electron is in the n th orbit. * 5
 (b) Explain the various series in the hydrogen spectrum on the basis of Bohr's theory. 6
 (c) The wavelength of the second line of the Balmer series in the hydrogen spectrum is 4861 \AA . Calculate the wavelength of the first line. 3
2. (a) State the laws of radioactive disintegration. * 2
 (b) Establish a relation between half-life and radioactive disintegration constant. * 7
 (c) Draw a comparative study on alpha, beta and gamma rays. 5
3. (a) Define- (i) Atomic mass unit, (ii) Binding energy, (iii) Mass defect and (iv) Mirror nuclei. 1.5 + 4 = 6
 (b) Sketch the curve of the binding energy per nucleon versus mass number. Qualitatively show that there is a possibility of release of energy on fusion of light elements and fission of heavy elements. 6
 (c) What do you mean by Q-value of a reaction? * 2
4. (a) Distinguish between angle of twist and angle of shear. Show that the couple required per unit twist in the case of a cylinder is $C = \pi n a^4 / 2l$. 3 + 6
 (b) For the case of modulus of rigidity, show that a shear is equivalent to an elongation and an equal compression at right angles to each other. 5
5. (a) How is the surface tension of a liquid explained on the basis of intermolecular forces? * 4
 (b) Show that the excess pressure acting on the curved surface of a curved membrane is given by $P = 2T \left(\frac{1}{r_1} + \frac{1}{r_2} \right)$, where r_1 and r_2 are the radii of curvature and T is the surface tension of the membrane. 7
 (c) Calculate the excess of pressure between the inside and outside of a soap bubble of radius 1 cm. Surface tension of soap solution is $3.0 \times 10^{-2} \text{ N/m}$. $P = \frac{2T}{r}$ 3
6. (a) Define critical velocity. Distinguish between streamline and turbulent flow of a liquid. 1 + 3
 (b) State and prove Bernoulli's theorem for a liquid along a stream line. 1 + 5
 (c) Water flows through a horizontal pipe line of varying cross-section. At a point where the pressure of water is $6.664 \times 10^3 \text{ Nm}^{-2}$, the velocity of flow is 0.25 ms^{-1} . Calculate the pressure at another point where velocity of flow is 0.4 ms^{-1} . Density of water 10^3 Kg m^{-3} . 4

Total energy
7. (a) What is plane diffraction grating? Briefly explain dispersive and resolving power of a grating. 2 + 3
 (b) Define coherent sources. Explain the importance of such sources in interference phenomenon. 1 + 2
 (c) What is polarization of light? Describe two methods for the formation of polarized light. 1 + 5

Patuakhali Science and Technology University

B.Sc.Engg.(CSE) Level-I Semester-II Final Examination-2016(July-December), Session:2015-2016

Course Code: PHY 121

Course Title: Physics-II

Credit Hour: 3.0

Full Marks:70

Time: 3 hours

[Answer any 5(five) of the following questions. Numbers on the right margin indicate full marks.]

1. (a) What is the difference between angle of twist and angle of shear? 3
 (b) Deduce an expression for the couple required to twist a uniform solid cylinder by an angle. 5
 (c) Conclude as such medium which have the same properties at all points and in all directions with examples. 5
 (d) Show that for a homogeneous isotropic medium $y = 2\eta(1 + \sigma)$, where letters have their usual meaning. 5
Handwritten notes: Young's modulus, Poisson's ratio, Rigidity modulus, isotropic medium
2. (a) When the area of a liquid surface is increased work is done against surface tension-why? 1
 (b) Prove that the surface energy per unit area of a surface is numerically equal to the surface tension. 4
 (c) Explain clearly from where the energy comes when the liquid rises against gravity in the capillary tube and the liquid meniscus is plane, concave or convex. Why? 1.5+
 (d) Apply the capillary action and find the expression for the height h to which a liquid of surface tension T may rise in a capillary tube of radius r . 1.5
6
3. (a) Distinguish between streamline and turbulent flow of a liquid. 3
 (b) Discuss briefly the idea of critical velocity and explain the significance of the Reynold's number. 3
 (c) Give with necessary theory Poiseuille's method of determining the coefficient of viscosity of a liquid. 1+5
 (d) How can we determine the various mechanism of blood flow in our body using Poiseuille's equation? 2
4. (a) Define mass flow rate and discharge (Q). If you know the mass flow is 1.5 kg/s, how long will it take to fill a container with 8 kg of fluid? 3+2
 (b) In a fluid mechanics write down the importance of the equation of continuity. 3
 (c) Show that the total energy of a small amount of an incompressible liquid flowing from one point to another remains constant throughout the displacement. 6
Handwritten note: Bernoulli's theorem
5. (a) Sketch the different series in the hydrogen spectrum and discuss the various characteristics on the basis of Bohr's theory. 5
 (b) The wavelength of the second line of the Balmer series in the hydrogen spectrum is 4861 \AA . Calculate the wavelength of the first line. 3
 (c) Describe the nature and properties of the charged particles emitted from radioactive substance. 3
 (d) What results are obtained in alpha particles scattering experiment? 3
8
6. (a) How does polycrystalline material differs from single crystal? State the differences. 2
 (b) Deduce Bragg's law and it's application to X-Ray diffraction. Justify the importance of using X-Ray in case of crystallographic analysis? 3+2
 (c) With appropriate illustration, explain all types of point defects that are found in crystals. 7
7. (a) Discuss the conditions to be satisfied by the waves to interfere with each other. 2
 (b) Two coherent sources of light being 0.23 mm apart are contributing to make an interference pattern on a screen which is 45cm away from them. The wavelength of the emitted light by the sources is 275 \AA . On the screen, what would be the order of the bright fringe that is found 0.16 mm away from the central bright fringe? 3
 (c) Differentiate between Fresnel and Fraunhofer diffraction. Develop a general equation for getting minima or dark points in case of Fraunhofer diffraction. 4
 (d) Write short notes on any two of the following topics: 2+2
 i) Brewster's Law; ii) Polarization by selective absorption; iii) Polarization by refraction 2.5+2.5