

U.G. 4th Semester Examination - 2024**PHYSICS****[HONOURS]****Skill Enhancement Course (SEC)****Course Code : PHY-H-SEC-T-2(A-D)**

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.***Answer all the questions from Selected Option.****OPTION-A****PHY-H-SEC-T-2A****(Weather Forecasting)****GROUP-A**

1. Answer any five questions: 2×5=10
- a) What is particulate matters?
 - b) What is Global warming potential?
 - c) How satellites are useful in weather forecasting?
 - d) What are Van Allen Belts?
 - e) Define acid rain.

[Turn over]

- f) What is catabetic wind?
- g) Define Easterly Jet Stream.
- h) Define lapse rate.

GROUP-B

2. Answer any two questions: $5 \times 2 = 10$
- a) Draw a diagram of temperature variation up to 100 km altitude.
 - b) Describe the forces acting to produce wind.
 - c) Explain the Electron density profile of ionosphere. How would you do the mapping of wind speed? $3+2$
 - d) What is climate change? Describe how climate is changed over a period of time in a particular region. $2+3$

GROUP-C

3. Answer any two questions: $10 \times 2 = 20$
- a) What is the importance of measuring meteorological parameters? Describe medium range weather forecasting. $5+5$
 - b) What is DALR? Compute the relation between DALR and SALR.

- c) What are the different methods of weather forecasting? Explain.
- d) Give a schematic diagram of the cloud structure of a typical thunderstorm. Highlight the charge separation zone.

OPTION-B

PHY-H-SEC-T-2B

(Renewable Energy & Energy Harvesting)

GROUP-A

1. Answer any five questions: $2 \times 5 = 10$

- a) What is solar module?
- b) What are the basic applications of geothermal energy?
- c) Define solar constant and declination angle.
- d) What are clean energy sources?
- e) Define geothermal drilling.
- f) How does a tide originate?
- g) What is wind turbine?
- h) State Lambert's Law.

GROUP-B

2. Answer any two questions: $5 \times 2 = 10$

- a) Write note on fossil fuel and its limitations.
- b) Wind turbine produces electromagnetic interference. – Discuss.
- c) Discuss the production of electricity by dry stream power plant.
- d) Briefly discuss the working of solar water heater.

GROUP-C

3. Answer any two questions: $10 \times 2 = 20$

- a) Discuss the mathematical models of devices to harvest electromagnetic energy.
- b) What is wind turbine? Discuss construction and working of a turbine. $2+4+4$
- c) What is Hydroelectricity? Explain the origin of hydroelectricity and its advantages. $2+4+4$
- d) Write short notes on (any two): $5+5$
 - i) Ocean energy
 - ii) Solar pond
 - iii) Geothermal energy

OPTION-C
PHY-H-SEC-T-2C
(Radiation Safety)
GROUP-A

1. Answer any **five** questions: $2 \times 5 = 10$
- Distinguish between nuclear fission and fusion with example.
 - What is Bremsstrahlung Process?
 - Write down main characteristics of X-ray.
 - Write two biological effects of ionizing radiation.
 - Define range of α particle. On what factor does range depend?
 - What are long-range α -particle? What is their origin?
 - What are Auger Electron?
 - Can an Auger electron be emitted when a metal is bombarded with visible light?

GROUP-B

2. Answer any **two** questions: $5 \times 2 = 10$
- Explain how the stability of a nucleus can be studied with the help of graph drawn between the binding energy per nucleon and mass number.

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- What is KERMA? How KERMA is different from absorbed dose? 2+3
- The mass of hydrogen atom and neutron are 1.008142 and 1.008982 amu respectively. Calculate binding energy per nucleon of Boron -10 (mass=10.01612 amu)
 - Explain the term 'mass defect' and 'binding energy' of a nucleus. 3+2
- Briefly explain operation of Geiger-Muller Counter (GM). What is meant by 'dead time' of a GM counter. 4+1

GROUP-C

3. Answer any **two** questions: $10 \times 2 = 20$
- Explain the terms absorbed dose, effective dose and equivalent dose. 2+2+2
 - Calculate the mass defect, binding energy and binding energy per nucleon for nickel nuclei. Given:

Mass of ${}^{64}_{28}\text{Ni}$ nucleus = 63.9126 a.m.u.,
 $m_p = 1.007285$ a.m.u., $m_n = 1.008665$
 a.m.u. and 1 a.m.u. = 931 MeV. 1+2+1

- b) i) Explain principle, construction and working of ionization chamber.
- ii) Differentiate between ionization chamber and GM counter.
- iii) Explain, Dead time and Recovery time of a GM counter. $(2+2+2)+2+2$
- c) Explain briefly (with one example) for application nuclear techniques in
- i) Archaeology
- ii) Medical science
- iii) Crime detection
- iv) Art
- v) Mining $2+2+2+2+2$
- d) i) What is Compton effect? Deduce the relation between the increase in wavelength and the angle scattering.
- ii) Write down Einstein's photoelectric equation and explain photoelectric effect. $(1+4)+(1+4)$

OPTION-D
PHY-H-SEC-T-02D
(Technical Drawing)

1. Answer any five questions: $2 \times 5 = 10$
- a) Draw the projections of a point A Which is at 40 mm above HP and 25 mm in front of V.P.
- b) What is RF?
- c) Define directing circle.
- d) What is a conic section?
- e) Name drawing instrument and accessories required for technical drawing.
- f) What is full form of CAD? Define AutoCAD?
- g) Write name of two terms each, used in projection of line and planes.
- h) What is the application of diagonal scale?
2. Answers any two questions: $5 \times 2 = 10$
- a) i) Draw an ellipse using Eccentricity Method if distance of focus from the directrix is 70 mm and eccentricity is $3/4$.
- ii) Name different methods used to construct ellipse. $3+2$

- b) i) Define Plane of Projection (POP)
- ii) Explain Isometric and oblique parallel projection of solid. 1+4
- c) What do you mean by cone and conic sections?
Define : Circle, Ellipse, Parabola. 2+3
- d) Draw a parabola whose focus is at a distance of 50 mm from the directrix. Draw a tangent and normal at any point on it. 5

3. Answer any two questions: 10×2=20

- a) i) How do you make a 3d drawing in 2d in AutoCAD?
- ii) Mention the function of following eight AutoCAD command
L ; C ; PL ; REC ; POL ; CO ; REG ; SC
- iii) What are dimensioning tools in AutoCAD?
- iv) Draw following circle using AutoCAD command. Centre (95,52) and radius = 16 units. 2+4+2+2
- b) i) Explain Orthographic projection of solids.
- ii) Write down principle of projection in technical drawing.

- iii) Name different method used in technical drawing for construction of Parabola and Hyperbola.

iv) Define Cycloidal curves 2+2+4+2

- c) Write down the advantages of CAD. Name two systems of projection. Draw a vernier scale of meters when 1mm represents 25cm and mark on it a length of 24.4cm and 23.1mm. Define vertical trace of a line. (3+2)+(3+2)
- d) Draw a straight line of length 7.5 cm. Divide the line into five equal parts. Explain the concept of precision drawing and why it is important CAD. 4+2+2+2