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 Forcasting)
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: $5\times2=10$

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: $10\times2=20$

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.

PHY-H-SEC-T-2B

(Renewable Energy & Energy Harvesting)

GROUP-A

1. Answer any **five** questions: 2×5=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: 5×2=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: 10×2=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

(Radiation Safety)

GROUP–A

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

   a) Distinguish between nuclear fission and fusion with example.

   b) What is Bremsstrahlung Process?

   c) Write down main characteristics of X-ray.

   d) Write two biological effects of ionizing radiation.

   e) Define range of α particle. On what factor does range depend?

   f) What are long-range α-particle? What is their origin?

   g) What are Auger Electron?

   h) Can an Auger electron be emitted when a metal is bombarded with visible light?

GROUP–B

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

   a) 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.

5

b) What is KERMA? How KERMA is different from absorbed dose? 2+3

c) i) 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)

   ii) Explain the term 'mass defect' and 'binding energy' of a nucleus. 3+2

d) 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: 10×2=20

a) i) Explain the terms absorbed dose, effective dose and equivalent dose.
   2+2+2

   ii) Calculate the mass defect, binding energy and binding energy per nucleon for nickel nuclei. Given:

   Mass of $_{28}^{64}Ni$ 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. $(1+4)+(1+4)$

Dhc

OPTION–D

PHY-H-SEC-T-02D

(Technical Drawing)

1. Answer any **five** questions: 2×5=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 requried 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: 5×2=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 Isomeric 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.

c)

d)

(10)

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

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

c) Write down the advantages of CAD. Name two systems of projection. Draw a venier 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. Devide the line into five equal parts. Explain the concept of precision drawing and why it is important CAD.   4+2+2+2

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