B.Sc./6th Sem (G)/PHS/23(CBCS)

2023

6th Semester Examination

PHYSICS (General)

Paper : SEC 4-T

[CBCS]

Full Marks : 25 Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

[Weather Forecasting]

Group - A

Answer any ***three*** from the following questions : 2×3=6

1. Which sensor measures air temperature?
2. What is Rayleigh scattering of radiation?
3. What are the four types of weather forecasting?
4. What do you mean by air mass?
5. What are the steps of hurricane formation?

P.T.O.

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P.T.O.

Group - B

Answer any ***two*** from the following questions : 5×2=10

6. Describe how air mass evolves.

7. What is the difference between persistence forecasting and statistical forecasting?

8. Discuss the causes and effects of global warming.

Group - C

Answer any ***one*** from the following questions : 9×1=9

9. What are the various types of air masses? Discuss in detail. What do you mean by stationary air front and occluded air front? 5+4=9

10. Describe the working principle of a cup anemometer. What do you mean by weather map? What are isohyets and isohels? 4+2+3=9

বঙ্গানুবাদ

বিভাগ - ক

নিম্নলিখিত প্রশ্নগুলির মধ্যে যে কোনো **তিনটি** প্রশ্নের উত্তর দাও। ২×৩=৬

১। কোন সেন্সর বায়ুর তাপমাত্রা পরিমাপ করে?

OR

[Radiation Safety]

1. Answer any ***three*** questions : 2×3=6

   (a) Write down basic characteristics of X-rays.

   (b) Give the definition of the unit of radioactivity.

   (c) Briefly mention the processes through which γ-ray interact with matter.

   (d) What types of radionuclides are used for cancer therapy and mention the reason for their use?

   (e) What are main differences among MRI, PET and X-ray CT?

2. Answer any ***two*** questions : 5×2=10

   (a) Define the processes : α-decay, β-decay, γ-decay.

   (b) Discuss on the main sources of radiation in environment.

   (c) Explain the basic principle of X-ray imaging technique.

3. Answer any ***one*** question : 9×1=9

   (a) (i) Write down the various quantities for measuring radiation dose. Give the definitions of these quantities.

(ii) Write down the recommendations of the International Commission on Radiation Protection (ICRP) on the annual dose. 2+4+3

(b) (i) Discuss on the risk assessment due to the effects of radiation.

(ii) Write a short note on nuclear waste and disposal management. 4+5

বঙ্গানুবাদ

১। যে কোন **তিনটি** প্রশ্নের উত্তর দাও। ২×৩=৬

(ক) X-রশ্মির মূল বৈশিষ্ট্যগুলি লেখ।

(খ) তেজস্ক্রিয়তার এককের সংজ্ঞা দাও।

(গ) γ-রশ্মি যে সকল পদ্ধতিতে পদার্থের সঙ্গে ক্রিয়া করে সেগুলি সংক্ষেপে লেখ।

(ঘ) ক্যান্সার চিকিৎসায় কি ধরনের তেজস্ক্রিয় নিউক্লাইড ব্যবহার করা হয় এবং ব্যবহার করার কারণ উল্লেখ করো।

(ঙ) MRI, PET এবং X-রশ্মি CT-এর মধ্যে মূল পার্থক্য কি?

২। যে কোন **দুটি** প্রশ্নের উত্তর দাও। ৫×২=১০

(ক) প্রক্রিয়াগুলির সংজ্ঞা দাও : α-বিঘটন, β-বিঘটন, γ-বিঘটন।

P.T.O.

OR

[Applied Optics]

Group - A

Answer any ***three*** from the following questions : 2×3=6

1. Write down the difference between Holography and ordinary photography.
2. What do you mean by a 'metastable state'?
3. A He-Ne laser has a coherence length of 10m. What is the coherence time?
4. What is the use of fibre optic sensor?
5. Write down the advantages of optical fibre over coaxial cable.

Group - B

Answer any ***two*** from the following questions : 5×2=10

6. (a) What is an optical resonator? Discuss the role played by it in a laser system. 1+2

   (b) Write down advantages and disadvantages of Fourier spectroscopy. 2

7. What are Einstein's A and B coefficients? Establish the relationship between them. 2+3

P.T.O.

8. (a) Describe the step-index and graded-index optical fibre with necessary diagram. 3

(b) The numerical aperture of an optical fibre is 0.5 and the core refractive index is 1.54. Find the refractive index of cladding. 2

Group - C

Answer any ***one*** from the following questions : 9×1=9

9. (a) What is population inversion? How is population inversion achieved in He-Ne laser? 2+3

(b) Derive the threshold condition for the laser action. 4

10. (a) Write down the difference between temporal coherence and spatial coherence. 2

(b) What is NMR spectroscopy? 2

(c) Explain the basic principle of holography with necessary diagram. 5

বঙ্গানুবাদ

বিভাগ - ক

যে কোনো তিনটি প্রশ্নের উত্তর দাও। ২×৩=৬

১। হলোগ্রাফী ও সাধারণ ফটোগ্রাফী-এর মধ্যে পার্থক্য লেখ।