Total number of printed pages–20

3 (Sem–5/CBCS) PHY SE

2022

PHYSICS

(Skill Enhancement Course)

Answer the Questions from any one Option.

OPTION–A

(Weather Forecasting)

Paper : PHY–SE–5014

OPTION–B

(Applied Optics)

Paper : PHY–SE–5024

OPTION–C

(Page Maker)

Paper : PHY–SE–5044

Full Marks : 50

Time : Two hours

The figures in the margin indicate full marks for the questions.

Contd.

OPTION–A

(Weather Forecasting)

Paper : PHY–SE–5014

*Answer **either** in English **or** in Assamese.*

1. Select the correct answer : ***(any four)*** 1×4=4

শুদ্ধ উত্তৰটো বাচি উলিওৱা ঃ *(যিকোনো চাৰিটা)*

(a) Ocean covered surface of the earth is ——

পৃথিবী পৃষ্ঠৰ মহাসাগৰে আবৰি থকা অংশৰ পৰিমাণ হ'ল——

(i) 50%

(ii) 80%

(iii) 70%

(iv) 65%

(b) Atmospheric layers are classified on the basis of ———.

বায়ুমণ্ডলীয় তৰপবোৰ ——— ৰ ওপৰত ভিত্তি কৰি শ্ৰেণীভুক্ত কৰা হৈছে।

(i) density
ঘনত্ব

(ii) temperature
উষ্ণতা

(iii) wind
বতাহ

(iv) radiation
বিকিৰণ

(c) Meteorologist commonly uses millibar unit for measurement of pressure. 1 millibar is equal to ———.

বতৰ বিজ্ঞানীয়ে সাধাৰণতে চাপ জুখিবলৈ মিলিবাৰ একক ব্যৱহাৰ কৰে। 1 মিলিবাৰ সমান ———।

(i) 10^2 *Pa*
10^2 পাস্কেল

(ii) 10 *Pa*
10 পাস্কেল

(iii) 10^3 *Pa*
10^3 পাস্কেল

(iv) 1 *Pa*
1 পাস্কেল

(d) Percentage of nitrogen in atmosphere is ————.

বায়ুমণ্ডলত নাইট্রজেনৰ শতাংশ পৰিমাণ হ'ল——

(i) 68

(ii) 78

(iii) 88

(iv) 58

(e) Rayleigh scattering occurs in all directions and is proportional to ————.

ৰেলীৰ বিচ্ছুৰণ সকলো দিশত ঘটে আৰুই —— ৰ সমানুপাতিক।

(i) λ^{-1}

(ii) λ^{-3}

(iii) λ^{-4}

(iv) λ^{-5}

(f) Wind direction is determined by ———
——ৰ সহায়ত বতাহৰ দিশ নির্ণয় কৰা হয়।

(i) anemometer
এনেমোমিটাৰ

(ii) hygrometer
হাইগ্রমিটাৰ

(iii) wind vane
উইন্দ ভেন

(iv) thermometer
থার্মোমিটাৰ

(g) Dry air, by volume is more than 99 per cent composed of ———
আয়তনৰ হিচাবত, শুকান বায়ু 99 শতাংশতকৈ বেছি
——ৰ মিশ্রণ।

(i) nitrogen and oxygen
নাইট্রজেন আৰু অক্সিজেন

(ii) nitrogen and hydrogen
নাইট্রজেন আৰু হাইড্রজেন

(iii) oxygen and carbon dioxide
অক্সিজেন আৰু কার্বন ডাইঅক্সাইড

(iv) hydrogen and oxygen
হাইড্রজেন আৰু অক্সিজেন

(h) Ozone layer protects us

অ'জন তৰপে আমাক সুৰক্ষিত কৰি ৰাখে

(i) from heat

তাপৰ পৰা

(ii) from blue radiation

নীলা বিকিৰণৰ পৰা

(iii) from UV radiation

অতিবেগুনী ৰশ্মিৰ পৰা

(iv) from electromagnetic radiation

বিদ্যুতচুম্বকীয় তৰংগৰ পৰা

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

যিকোনো তিনিটা প্ৰশ্নৰ উত্তৰ দিয়া ঃ

(a) What is hyetograph ?

হাইটোগ্ৰাফ কি ?

(b) How relative humidity is determined ?

আপেক্ষিক আৰ্দ্ৰতা কেনেকৈ নিৰ্ণয় কৰা হয় ?

(c) What are the differences between tornadoes and hurricanes ?

ট'ৰনেডো আৰু হাৰিকেনৰ মাজত পাৰ্থক্য কি কি?

(d) Atmospheric gases obey few simple laws in response to changes in pressure and temperature. Write *two* laws.

বায়ুমণ্ডলীয় গেছবোৰে চাপ আৰু উষ্ণতা পৰিবৰ্তনত সৰল সূত্ৰ মানি চলে। *দুটা* সূত্ৰ লিখা।

(e) Write *two* lines about Indian summer monsoon.

ভাৰতীয় গ্ৰীষ্ম মৌচুমীৰ বিষয়ে দুশাৰী লিখা।

(f) How wind speed and direction are measured ?

বতাহৰ দ্ৰুতি আৰু দিশ কেনেকৈ পৰিমাপ কৰা হয়?

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

যিকোনো দুটা প্ৰশ্নৰ উত্তৰ লিখা ঃ

(a) What are the factors that affect wind motion ? Briefly explain them.

বতাহৰ গতিৰ ওপৰত প্ৰভাৱ পেলোৱা কাৰকবোৰ কি কি? সেইবোৰ চমুকৈ বৰ্ণনা কৰা।

(b) "Modern weather forcasting did not become possible until weather information could be collected, assembled and processed rapidly." Explain it.

"আধুনিক বতৰ পূৰ্বানুমান সম্ভৱ হোৱা নাছিল যেতিয়ালৈকে বিভিন্ন তথ্য সংগ্ৰহ, জমাৰখা আৰু তাৎক্ষণিক বিশ্লেষণ সম্ভৱ নাছিল।" ইয়াৰ ব্যাখ্যা দিয়া।

(c) What are the most important parameters to forecast weather? Briefly discuss about them.

বতৰৰ পূৰ্বানুমানৰ বাবে আটাইতকৈ বেছি প্ৰয়োজনীয় ৰাশিবোৰ কি? সেইবোৰৰ বিষয়ে চমুকৈ আলোচনা কৰা।

(d) Discuss about general circulation model (GCM).

সাধাৰণ ঘূৰ্ণায়মান আৰ্হি (GCM) ৰ বিষয়ে আলোচনা কৰা।

(e) What types of information are essential to forecast flood and erosion?

বানপানী আৰু গৰাখহনীয়াৰ পূৰ্বানুমান কৰিবলৈ কি ধৰনৰ তথ্যক অতি প্ৰয়োজন?

(f) How variation of rainfall amount and intensity depend on wind direction ?

বতাহৰ দিশৰ ওপৰত বৰষুণৰ পৰিমাণ আৰু তীব্ৰতা কেনেকৈ নিৰ্ভৰ কৰে?

4. Answer ***any three*** questions : 10×3=30

যিকোনো তিনিটা প্ৰশ্নৰ উত্তৰ লিখা ঃ

(a) What are the different layers of atmosphere ? Discuss the characteristics of these layers.

বায়ুমণ্ডলৰ বিভিন্ন তৰপবোৰ কি কি? এই তৰপবোৰৰ বৈশিষ্ট্য আলোচনা কৰা।

(b) Cloud is the main source of rain. What are the different types of cloud ? Explain one by one.

বৰষুণৰ মুখ্য উৎস হ'ল মেঘ। বিভিন্ন প্ৰকাৰৰ মেঘ কি কি? এটা এটাকৈ ব্যাখ্যা কৰা।

(c) What is precipitation ? Describe the forms of precipitation. Mention the precipitation characteristics.

অধঃক্ষেপণ কি? বিভিন্ন প্ৰকাৰৰ অধঃক্ষেপণৰ বৰ্ণনা দিয়া। অধঃক্ষেপণৰ বৈশিষ্ট উল্লেখ কৰা।

(d) Discuss about short and medium-range forecast of weather.

হ্রস্ব আৰু মধ্যমীয়া পৰিসৰত বতৰৰ আগজাননীৰ বিষয়ে আলোচনা কৰা।

(e) Discuss solar radiation energy distribution mechanism in atmosphere.

বায়ুমন্দলত সৌৰ বিকিৰণ শক্তি বিতৰণ পদ্ধতি আলোচনা কৰা।

(f) Weather and climate are different. How? What is climate change?

বতৰ আৰু জলবায়ু বেলেগ। কেনেকৈ? জলবায়ু পৰিবৰ্তন কি?

(g) Give detailed explanation about absorption, emission and scattering of radiation in atmosphere.

বায়ুমণ্ডলত বিকিৰণৰ বাবে ঘটা শোষণ, নিৰ্গমন আৰু বিচ্ছুৰণৰ বিষয়ে বিতং ব্যাখ্যা দিয়া।

(h) Write a short essay on global warming and its outcomes.

গোলকীয় উষ্ণতা বৃদ্ধি আৰু ফলাফলৰ বিষয়ে চুটি ৰচনা লিখা।

OPTION–B

(Applied Optics)

Paper : PHY–SE–5024

1. Answer ***any four*** of the following questions : 1×4=4

(a) The fibers mostly not used nowadays for optical fiber communication systems are _____.

(i) single-mode fibers

(ii) multimode step fibers

(iii) coaxial cables

(iv) multimode-graded index fibers

(b) Which process gives the laser its special properties as an optical source ?

(i) Dispersion

(ii) Stimulated absorption

(iii) Spontaneous emission

(iv) Stimulated emission

(c) The technique by which an image is obtained from a hologram is called_____.

(i) formation

(ii) construction

(iii) reconstruction

(iv) projection

(d) Multimode step-index fiber has_____.

(i) large core diameter and large numerical aperture

(ii) large core diameter and small numerical aperture

(iii) small core diameter and large numerical aperture

(iv) small core diameter and small numerical aperture

(e) _____ in the laser occurs when a photon colliding with an excited atom causes the stimulated emission of a second photon.

(i) Light amplification

(ii) Attenuation

(iii) Dispersion

(iv) Population inversion

(f) Holography is based on the principle of _____.

(i) interference

(ii) diffraction

(iii) interferometer

(iv) polarization

(g) The numerical aperture of a step-index fiber is given by

(i) $\sqrt{n_2^2 - n_1^2}$

(ii) $\sqrt{n_1^2 - n_2^2}$

(iii) $\sqrt{n_1^2 - n_2^2}/n$

(iv) None of the above

(h) The information in the hologram exists in _____.

(i) colored image form

(ii) black and white image form

(iii) 3-D image form

(iv) coded form

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

(a) What is the meaning of the term 'LASER'? Give some applications of the Laser.

(b) The coherent time for sodium light of wavelength 5890 *A* is 10^{-10} s. Find the corresponding value of coherent length.

(c) What are virtual and real images about the reconstruction of the image from the hologram ?

(d) Why is the core's refractive index greater than the optical fiber cladding ?

(e) What do you understand by 'a metastable state'? Give an example.

(f) Differentiate between step-index fiber and graded-index fiber.

3. Answer ***any two*** of the following questions : 5×2=10

(a) What are optical fibers ? What are the advantages of fibers over metallic-based cables ?

(b) Differentiate between spontaneous emission and stimulated emission.

(c) The refractive indices of the core and cladding of an optical fiber are 1.55 and 1.50 respectively. Calculate the numerical aperture (NA) and the acceptance angle of the optical fiber.

(d) Define population inversion. Why is population inversion necessary for laser action ?

(e) The wavelength of emission is $6000\ \mathring{A}$ and the coefficient of spontaneous emission is 10^6 / s. Find the coefficient for stimulated emission.

(f) Write a short note on photon multiplication.

4. Answer ***any three*** of the following questions : 10×3=30

(a) Define Einstein's coefficients. Derive the relation between them. 4+6=10

(b) Describe the structure of a typical optical fiber giving the necessary diagram. What do you mean by acceptance angle and numerical aperture? 5+5=10

(c) (i) A laser beam has a power of 100 mW and aperture of 4×10^{-3} mlt emits light of wavelength $6000\ \mathring{A}$. The beam is focused with a lens of focal length 0.1 m. Calculate the intensity of the image. 5

(ii) The core and cladding of a silica optical fiber have refractive indices of $n_1 = 1.5$ and $n_2 = 1.4$ respectively. Calculate the critical angle of reflection for the core-cladding boundary and also the acceptance angle of the fiber. 5

(d) Explain the basic principle of holography. What is the essential difference between a conventional photograph and a hologram? 5+5=10

(e) Describe how a hologram is generated and the image reconstructed using off-axis configuration.

(f) Explain the principle of optical pumping and stimulated emission of radiation. Explain the action of a *He-Ne* laser. How is it superior to a ruby laser?

4+4+2=10

(g) Describe schematically, using a block diagram, the basic elements of the fiber optics communication system.

(h) Describe with suitable diagrams the principle, construction, and working of a ruby laser. What is meant by 'spiking'?

7+3=10

OPTION–C

(Page Maker)

Paper : PHY–SE–5044

1. Answer ***any four*** of the following questions : 1×4=4

(a) In which menu contains the 'column guide' option ?

(b) Is PageMaker a word processing software ?

(c) What is the extension of file created in PageMaker 7.0 ?

(d) What is 'text wrap' ?

(e) What is the keyboard shortcut to save an existing file ?

(f) Which menu contains the 'past special' option ?

(g) Write the name of the company who developed PageMaker 7.0.

(h) What is toolbar ?

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

(a) What is the use of hand tool ?

(b) Define 'edit' menu in PageMaker.

(c) What is control palette ?

(d) Define group and ungroup in PageMaker.

(e) What is 'stroke' ?

(f) What is 'tracking' of letters ?

3. Answer ***any two*** of the following questions : 5×2=10

(a) What is leading ?

(b) Write a note on 'master page' of PageMaker.

(c) Describe about the features of the 'tools'.

(d) Define 'crop' tool.

(e) What command will you use to insert page ?

(f) Explain the concept of bullets and numbering.

4. Answer ***any three*** of the following questions : 10×3=30

(a) Describe the steps of drawing and placing of various shapes in PageMaker.

(b) Write a descriptive note on the use of PageMaker.

(c) Elaborate the step-by-step process of opening a new file.

(d) Describe rulers and guides. How do you change the unit of measurement in ruler. Discuss.

(e) Define 'element' menu. What features are there in it? Briefly explain all.

(f) What is type specification ? Discuss in brief.

(g) Discuss about the creating column.

(h) How can you format a paragraph ?
