(6 pages) Reg. No. : .....

Code No. : 20306 E **Sub. Code : AEPH 52**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fifth Semester

Physics

Major Elective – COMMUNICATION ELECTRONICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In India, ———— modulation is used for radio transmission.
   (a) Frequency
   (b) Amplitude
   (c) Phase
   (d) None of the above

2. The modulation index of an AM wave is changed from 0 to 1. The transmitted power is
   (a) unchanged
   (b) halved
   (c) doubled
   (d) increase by 50 percent

3. In a TRF radio receiver, the RF and detection stages are tuned to
   (a) Radio frequency (b) IF
   (c) Audio frequency (d) None of the above

4. Super hertodyne principle refers to
   (a) Using a large number of amplifier stages
   (b) Using a push-pull circuit
   (c) Obtaining lower fixed intermediate frequency
   (d) None of the above

5. When the modulating frequency is doubled, the modulation index is halved, and the modulating voltage remains constant. The modulation system is
   (a) amplitude modulation
   (b) phase modulation
   (c) frequency modulation
   (d) any of the three

6. One of the following is an indirect way of generating FM. This is the
   (a) Reactance FET modulator
   (b) Varactor diode modulator
   (c) Armstrong modulator
   (d) reactance bipolar transistor modulator

7. In a broadcast superheterodyne receiver, the
   (a) local oscillator operates below the signal frequency
   (b) mixer input must be tuned to the signal frequency
   (c) local oscillator frequency is normally double the IF
   (d) RF amplifier normally works at 455 kHz above the carrier frequency

8. Since noise phase-modulates the FM wave, as the noise sideband frequency approaches the carrier frequency, the noise amplitude
   (a) remains constant (b) is decreased
   (c) is increased (d) is equalized

9. The maximum bandwidth is occupied by
   (a) ASK (b) BPSK
   (c) FSK (d) None of the above

10. The bandwidth of BFSK is ———— than BPSK.
    (a) Lower (b) Same
    (c) Higher (d) Not predictable

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Define Modulation Index. How do you calculate the modulation index for AM wave?

    Or

    (b) Describe about the broadcast AM Transmitter AM.

12. (a) Discuss about the Quadrature amplitude modulation.

    Or

    (b) Explain about the double frequency AM receiver.

13. (a) Summarize the theory of phase modulation.

    Or

    (b) Estimate the average power of an AM/FM wave.

14. (a) Develop the circuit of FM detector.

Or

(b) Evaluate the noise suppression for periodic signals using high-resolution frequency.

15. (a) Explain differential PSK.

Or

(b) Illustrate the examples of Duobinary encoding.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Discuss about the power distribution in an amplitude modulated Wave.

Or

(b) Explain the function of AM transmitter.

17. (a) Sketch and explain the operation of AM receivers.

Or

(b) Explain about the basic principle of super heterodyne.

18. (a) Illustrate the examples of frequency modulation.

Or

(b) Compare AM and FM.

19. (a) Define foster-seely discriminator and how does it work.

Or

(b) Explain clearly the basic principle of threshold extension using FMFB technique.

20. (a) Explain the working of binary phase shift keying (bpsk).

Or

(b) Draw and explain Mary FSK with block diagram.

———————

(6 pages) Reg. No. :.....

Code No. : 20300 E **Sub. Code : AMPH 52**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fifth Semester

Physics — Core

SPECTROSCOPY

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The vibrational stretching frequency of diatomic molecule depends on
   (a) Force constant
   (b) Masses of two atoms
   (c) Both (a) and (b)
   (d) None

2. The wave number difference between successive rotational levels of a rigid diatomic molecule is
   (a) $2BJ$ (b) $BJ(J+1)$
   (c) $2BJ(J+1)$ (d) $2BJ(J-1)$

3. Which of the following absorb IR radiation?
   (a) Homonuclear diatomic molecule
   (b) Heteronuclear diatomic molecule
   (c) Both (a) and (b)
   (d) Diatomic molecules will not absorb IR

4. Over tones are mainly observed in
   (a) near IR
   (b) mid IR
   (c) far IR
   (d) Not in IR region

5. Which of the following cannot be conserved during Raman scattering?
   (a) Total Energy (b) Momentum
   (c) Kinetic Energy (d) Electronic Energy

6. The Raman spectrum is said to consist of Strokes lines when _____
   (a) $\Delta\upsilon > 0$
   (b) $\Delta\upsilon < 0$
   (c) $\Delta\upsilon = 0$
   (d) Does not depend on $\Delta\upsilon$

7. Beer Lambert's law gives the relation between which of the following?
   (a) Reflected radiation and concentration
   (b) Scattered radiation and concentration
   (c) Energy absorption and concentration
   (d) Energy absorption and reflected radiation

8. In which of the following ways, absorption is related to transmittance?
   (a) Absorption is the logarithm of transmittance
   (b) Absorption is the reciprocal of transmittance
   (c) Absorption is the negative logarithm of transmittance
   (d) Absorption is a multiple of transmittance

9. NMR spectrometer provides _____ and _____ method of determining structure in soluble chemical compounds.
   (a) Accurate, destructive
   (b) Accurate, non- destructive
   (c) Inaccurate, destructive
   (d) Inaccurate, non-destructive

10. What does "MRI" stand for?
    (a) Magneto-Ray Idometry
    (b) Medical Radiometry Instrument
    (c) Magnetic Resonance Imaging
    (d) Maximal Radiology Imaging

PART B — (5 × 5 = 25 marks)

Answer ALL questions, by choosing (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the intensities of spectral lines of diatonic molecule.

Or

(b) Describe about the techniques of linear polyatomic molecules.

12. (a) Write a note on interaction of rotations and vibrations.

Or

(b) Analyse the IR techniques of polyatomic molecule.

13. (a) Write an essay on Raman effect.

Or

(b) Discuss about the structure determination from IR and Raman spectroscopy.

14. (a) Describe about the Transmittance and obsorbance of UV spectroscopy.

Or

(b) List out the applications of UV spectrophotometer.

15. (a) Discuss about the instrumentation for NMR spectroscopy.

Or

(b) Explain the principle of NMR spectroscopy.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, by choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the theory of pure rotational spectra of diatomic molecule.

Or

(b) Give an account on non-rigid rotator.

17. (a) Obtain an expression for zero point energy for an unhormonic oscillator.

Or

(b) Describe about the vibration of polyatomic molecules.

18. (a) Explain classical theory of Raman effect.

Or

(b) Describe the Raman spectrum of symmetric top molecules.

19. (a) Explain the principle of ultraviolet spectroscopy.

Or

(b Write an essay on UV spectrophotometer.

20. (a Describe the theory of NMR spectroscopy.

Or

(b) Narrate an essay on Magnetic resonance imaging (MRI).

———————

(6 pages)

Reg. No. : .....

Code No. : 20301 E **Sub. Code : AMPH 53**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fifth Semester

Physics — Core

ATOMIC AND NUCLEAR PHYSICS

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

The direction of deflection of positive rays is opposite to that

(a) Canal rays

(b) Cathode rays

(c) IR rays

(d) UV rays

Primary consmic rays consists of

(a) 9% proton 90% helium

(b) 9% He 75% proton

(c) 90% proton 9% helium

(d) 90% Helium 10% proton

The average binding energy per nucleon of a nucleus in an atom is

(a) 8 ev (b) 8 Mev

(c) 8 joule (d) 15 Mev

The radius of nucleus is approximately

(a) $10^{-15}\ m$ (b) $10^{-12}\ m$

(c) $10^{-18}\ m$ (d) $10^{15}\ m$

Heavier particle groups are formed by

(a) Protons (b) Neutrons

(c) Baryons (d) Mesons

Nuclear Fission can be explained by

(a) Shell model

(b) Liquid drowpmodel

(c) Quar K model

(d) Vector model

The velocities of positive rays are ranging from

(a) 10^{1} *to* $10^{3}\ ms^{-1}$

(b) 10^{5} *to* $10^{6}\ ms^{-1}$

(c) 10^{7} *to* $10^{8}\ ms^{-1}$

(d) 10^{3} *to* $10^{6}\ ms^{-1}$

The spin quantum number is

(a) $-1/2$ (b) 2

(c) ½ (d) $\pm 1/2$

The orbital quantum number starts from

(a) 0, 1, 2, 3.... (n-1)

(b) 0, 1, 2, 3....(n+1)

(c) 1, 2, 3 (n-1)

(d) 1, 2, 3 (n+1)

The Wavelength of x-ray is

(a) 5 A° to 10

(b) 10 to 0.5

(c) 0.1 to 0.10

(d) 0.5 to 5A°

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive an expression for electrical conductivity.

Or

(b) Write the properties of positive rays.

12. (a) State and explain Pauli's exclusion principle.

Or

(b) Write a note on

(i) J – J coupling

(ii) Magnetic dipole moment due to orbital motion of the electron

13. (a) Write the properties of x rays.

Or

(b) State and explain Moseley's law.

14. (a) Explain Binding energy curve of nucleus.

Or

(b) Explain Betatron with a diagram.

15. (a) Define

(i) Q value of a nuclear reaction.

(ii) Nuclear fission

Or

(b) Explain principle and action of atom bomb.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) State and explain Hall effect.

Or

(b) Explain Aston's mass spectrograph with diagram.

17. (a) Describe the vector Atom model. Explain various quantum numbers associated with it and bring out its merits.

Or

(b) Explain stark effect.

18. (a) Describe Laue's method and point out its significance.

Or

(b) What are cosmic ray showers and van allen belts?

19. (a) Describe the shell model of the nucleus.

Or

(b) Explain the construction working of cloud chamber.

20. (a) Explain how a hydrogen bomb works.

Or

(b) Narrate the Quark model of elementary particles.

———————

(6 pages) Reg. No. : .....

Code No. : 20302 E **Sub. Code : ASPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Physics

Skill Based Subject — MAINTENANCE OF ELECTRICAL APPLIANCES

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. An example of non-ohmic resistance
   (a) diode
   (b) tungsten wire
   (c) carbon resistance
   (d) copper wire

2. An ammerter is a
   (a) secondary instrument
   (b) absolute instrument
   (c) recording instrument
   (d) integrating instrument

3. The dielectric strength of transformer oil is expected to be
   (a) 1 KV (b) 33 KV
   (c) 100 KV (d) 330 KV

4. Continuous cooling transformation diagrams are mainly drawn for
   (a) iron (b) manganese
   (c) any alloy (d) steel

5. Why the split AC become very popular?
   (a) can fix if an window
   (b) take less amount
   (c) silent operation
   (d) very cheap.

6. Water heater was invented by

(a) Sir Joseph Henry

(b) Sir Alfred Lee Loom's

(c) Sir Edwin Rund

(d) Sir Joseph Nicephone

7. The contact resistance of a manually operated switch is

(a) zero (b) very high

(c) very low (d) none of the above

8. Which switch should have?

(a) A high insulation resistance

(b) Low insulation

(c) Insulation resistance equal to content resistance

(d) None of the above

9. Lamination's of core are generally made of?

(a) Case iron (b) Carbon

(c) Silicon steel (d) Stainless steel

10. Wedding generator win have ————

(a) lap winding (b) wave winding

(c) delta winding (d) duplex wave winding

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write a short note on galvonameter and working principle.

Or

(b) Write a short note on Ohm's law and application.

12. (a) Describe the working principle of hot plates.

Or

(b) Write a short note on testing of transformer.

13. (a) Write a short note on stabilizer.

Or

(b) Write a short note on electric bulbs.

14. (a) Give a short note on single phase and three phase connection.

Or

(b) Give a short note on color code for insulator.

15. (a) Write a short note on ELCB.

Or

(b) Explain about the relays and fuses.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Explain about the electrical power.

Or

(b) Explain about the ohm's law and application of ohm's law.

17. (a) Explain about the cooling of transformer.

Or

(b) Explain about the transformer lossess.

18. (a) Explain about the stabilizer.

Or

(b) Explain about the Fridge and air conditioner.

19. (a) Explain about the overloading earth.

Or

(b) Explain about the RMS and peak values.

20. (a) Explain about the inverter.

Or

(b) Explain about the overloading devices.

———————

(6 pages) Reg. No. : .....

Code No. : 20302 E **Sub. Code : ASPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Physics

Skill Based Subject — MAINTENANCE OF ELECTRICAL APPLIANCES

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. An example of non-ohmic resistance
   (a) diode
   (b) tungsten wire
   (c) carbon resistance
   (d) copper wire

2. An ammerter is a
   (a) secondary instrument
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   (c) recording instrument
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3. The dielectric strength of transformer oil is expected to be
   (a) 1 KV (b) 33 KV
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4. Continuous cooling transformation diagrams are mainly drawn for
   (a) iron (b) manganese
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(b) Low insulation

(c) Insulation resistance equal to content resistance

(d) None of the above

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(c) Silicon steel (d) Stainless steel

10. Wedding generator win have ————

(a) lap winding (b) wave winding

(c) delta winding (d) duplex wave winding

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

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Or

(b) Write a short note on Ohm's law and application.

12. (a) Describe the working principle of hot plates.

Or

(b) Write a short note on testing of transformer.

13. (a) Write a short note on stabilizer.

Or

(b) Write a short note on electric bulbs.

14. (a) Give a short note on single phase and three phase connection.

Or

(b) Give a short note on color code for insulator.

15. (a) Write a short note on ELCB.

Or

(b) Explain about the relays and fuses.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Explain about the electrical power.

Or

(b) Explain about the ohm's law and application of ohm's law.

17. (a) Explain about the cooling of transformer.

Or

(b) Explain about the transformer lossess.

18. (a) Explain about the stabilizer.

Or

(b) Explain about the Fridge and air conditioner.

19. (a) Explain about the overloading earth.

Or

(b) Explain about the RMS and peak values.

20. (a) Explain about the inverter.

Or

(b) Explain about the overloading devices.

———————

(6 pages) Reg. No. : .....

Code No. : 20392 E **Sub. Code : CAPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

First/Third Semester

Physics – Allied

ALLIED PHYSICS – I

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. The unit of Hooke's law is

(a) Nm

(b) Nm^{-2}

(c) Nm^{-1}

(d) Nsm

2. In young's modulus the diameter of the wire is doubled its length is

(a) Halved (b) One by fourth

(c) Three by fourth (d) Two by fourth

3. Excess pressure inside a liquid drop is

(a) $\frac{T}{r}$ (b) $\frac{2T}{r}$

(c) $\frac{4T}{r}$ (d) $\frac{3T}{r}$

4. The molecular range for solids and liquids is

(a) $10^{-8}m$ (b) $10^{-7}m$

(c) $10^{-9}cm$ (d) $10^{-5}cm$

5. When a body vibrates with its own natural frequency in called

(a) Damped oscillations

(b) Free oscillation

(c) Electromagnetic oscillations

(d) Oscillation

6. Maximum displacement is called

(a) Amplitude (b) Velocity

(c) Oscillation (d) Time period

7. Dimensional formula for coefficient of thermal conductivity is

(a) MLT (b) $MLTQ^{-1}$

(c) $MLT^{-3}Q^{-1}$ (d) $MLT^{-2}Q^{-1}$

8. Identify the very good insulator

(a) Saw dust (b) Cork

(c) Asbestos sheet (d) Glass wool

9. Interface was first observed by

(a) Thomas young (b) Newton

(c) Ohm (d) Galileo

10. What is the phase difference of emerging wave is half wave plate

(a) 90° (b) 180°

(c) 270° (d) 360°

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Calculate work done in stretching a wire.

Or

(b) Discuss the theory of Torsion Pendulum.

12. (a) Define (i) Surface tension with its unit and dimensions (ii) Viscosity.

Or

(b) Describe Stoke's formula for highly viscous liquid.

13. (a) Write a note resonance in SHM.

Or

(b) State and explain Longitudinal mode of vibrations.

14. (a) Obtain expression for viscosity and thermal conductivity.

Or

(b) Explain Distribution of energy in black body spectrum.

15. (a) Obtain condition for interference.

Or

(b) Describe production and detection of plane polarized light.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the experimental determination of Young's modulus using Pin and microscope by uniform bending.

Or

(b) Derive expression for couple per unit twist.

17. (a) Derive expression for excess of pressure inside a synclastic and anticlastic surface.

Or

(b) Explain analogy between liquid flow and current flow.

18. (a) Explain the composition of two SHMs along a straight line and in perpendicular direction.

Or

(b) Define simple harmonic motion. Explain velocity acceleration and period of SHM.

19. (a) Describe the Lees disc experiment to find the thermal conductivity of bad conductor.

Or

(b) State and explain Wiedmann-Franzis law.

20. (a) Explain how the rectilinear propagation of light is explained by Fresnel.

Or

(b) Explain production and detection of plane elliptically polarised light.

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...ges) **Reg. No. :**.....

...ode No. : 30622 E **Sub. Code : CAPH 21**

(CBCS) DEGREE EXAMINATION, APRIL 2022.

Second Semester

Physics — Allied

ALLIED PHYSICS – II

(For those who joined in July 2021 onwards)

...e : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

The rate of flow of electric charge is called as

(a) Voltage

(b) Resistance

(c) Electric Current

(d) Potential difference

2. The electric current flowing through the resistor is inversely proportional to its

(a) Potential difference

(b) Voltage

(c) Charge

(d) Resistance

3. The production of induced current in one coil due to production of current in neighboring coil is

(a) Electromagnetism

(b) induction

(c) mutual inductioin

(d) steady current

4. Lenz devised a rule of find out the direction of

(a) current induced in a circuit

(b) electromagnetic difference

(c) potential difference

(d) flow of power in fuse

5. The two forces which are equal in magnitude but opposite in direction form a

(a) friction

(b) couple

(c) torque

(d) work done

In which gate the output is high when any one or all inputs are high?

(a) AND (b) NAND

(c) OR (d) NOR

The nucleus consists of

(a) neutrons

(b) protons

(c) neutrons and protons

(d) electronics and neutrons

The difference in the mass of the resultant nucleus and the sum of the masses of two parent nuclear particle is known as

(a) mass defect

(b) solid defect

(c) weight defect

(d) nucleus defect

Which of the following formulae is used determine the time of flight for projectile motion, when joint of projection and point of landing are on same level of horizontal plane?

(a) $(2u \sin \alpha) / g$ (b) $(u^2 \sin \alpha) / 2g$

(c) $(2u \sin \alpha) / g \cos \theta$ (d) $2ug \sin \alpha$

10. The Special theory of relativity treats problems involving

(a) inertil frame of reference

(b) non-inertial frame of reference

(c) non-accelerated frame of reference

(d) accelerated frame of reference

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Write a short notes on Current and Current density.

Or

(b) What are the applications of Kirchoff's Laws in Wheatstone bridge network.

12. (a) Define magnetic induction B and magnetic field intensity H.

Or

(b) What is self inductance? Explain it.

13. (a) Explain the working action of Junction diode.

Or

(b) What is OR-Gate? Explain it.

14. (a) Discuss about the Nuclear size and Nuclear mass.

Or

(b) Write a note on mass defect.

15. (a) Define projectiles. Explain it.

Or

(b) Explain the term "Frame of reference'. Give it's an examples.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Write an essay on application of Kirchoff's Laws.

Or

(b) Discuss about the conversion of galvanometer into voltmeter.

17. (a) Write down the properties of paramagnetic materials.

Or

(b) Derive an expression for induced current and charge.

18. (a) Describe about the characteristics of CE transistor.

Or

(b) Explain NAND and NOR Gates

19. (a) Explain the basic properties of Nucleus.

Or

(b) Write an essay on Nuclear forces.

20. (a) Write an essay on Range on the horizontal plane.

Or

(b) Derive the equation of Lorentz transformation.

———————

(6 pages) **Reg. No. :** .....

Code No. : 20393 E **Sub. Code : CAPH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Second/Fourth Semester

Physics – Allied

ALLIED PHYSICS – II

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In resistors, the silver stripe tolerance is

   (a) ±5% (b) ±10%

   (c) +5% (d) +10%

2. A circuit is a _____ loop.

   (a) Short circuited (b) Closed

   (c) Opened (d) Both (a) and (b)

3. Magnetic permeability is maximum for _____ materials.

   (a) Diamagnetic (b) Paramagnetic

   (c) Ferromagnetic (d) None of the above

4. The direction of magnetic lines of force is _____.

   (a) From south end to north pole

   (b) From north pole to south pole

   (c) From one end of the magnet to another

   (d) None of these

5. Which of the following semiconductor is mostly used to construct electronic circuits?

   (a) Silicon (b) Germanium

   (c) Selenium (d) Tin

6. The one's complement of binary number 0101 is

   (a) 1010 (b) 1011

   (c) 0110 (d) 1110

7. An alpha particle is same as _____.

(a) A helium nucleus

(b) A hydrogen nucleus

(c) A proton

(d) A positron

8. Radio carbon dating technique is used to estimate the age of _____.

(a) Soil (b) Fossils

(c) Rocks (d) Buildings

9. Which of the following is not an example of projectile?

(a) A bullet fired from a gun

(b) A kicked football

(c) Taking off of an aircraft

(d) A javelin thrown by an athlete

10. According to the special theory of relativity, physical laws are the same in all frames of reference, if they

(a) Move at uniform velocity

(b) Are accelerated

(c) Move in circles

(d) Move in ellipses

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Describe the expression for current density.

Or

(b) Using wheatstone's bridge, find the unknown resistance of a resistor.

12. (a) Derive the relation between M, B and H in magnetic materials.

Or

(b) Derive the Faraday's laws of electromagnetic induction and Lenz's law.

13. (a) Convert the following decimal numbers into binary numbers (i) $(55.95)_{10}$ (ii) 110_{10} (iii) 13_{10} (iv) 27_{10} (v) 44_{10}

Or

(b) Explain OR gate. Give its symbol, truth table and Boolean equation.

14. (a) Explain mass defect and binding energy.

Or

(b) Discuss the following terms. (i) nuclear charge (ii) nuclear spin (iii) nuclear magnetic moment.

15. (a) Explain the different frames of reference.

Or

(b) Describe briefly time dilation.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Explain the current voltage characteristics of a resistor and hence verify ohm's law.

Or

(b) Describe how a galvanometer can be converted into a voltmeter.

17. (a) Define self induction and hence derive the expression for the self inductance of a long solenoid.

Or

(b) Write the properties of dia and ferromagnetic materials.

18. (a) Explain the V-I characteristics of a zener diode. Give its uses.

Or

(b) Explain binary addition and binary subtraction with examples.

19. (a) Explain the properties of nucleic.

Or

(b) Write a short note on nuclear forces and explain the various properties of nucleus.

20. (a) Derive the expression for range, time of flight and maximum height of a projectile on a horizontal plane.

Or

(b) Derive Galilean transformation equations.

———————

(6 pages) **Reg. No. :**.....

Code No. : 20389 E **Sub. Code : CMPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

First Semester

Physics – Core

PROPERTIES OF MATTERS AND MECHANICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. The expression for stress is ———— ($F \rightarrow$ Force, $A \rightarrow$ Area)

   (a) F / A (b) A / F

   (c) $F.A.$ (d) None

2. The rise in temperature of a metal ———— the elasticity.

   (a) Increases (b) Decreases

   (c) Constant (d) None

3. When a beam is bending, the surface which does not undergo any change is ————

   (a) Neutral surface

   (b) Flat surface

   (c) Cross-sectional surface

   (d) None of these

4. A beam is a rod whose length is ———— thickness.

   (a) Lesser than

   (b) Greater than

   (c) Much greater than

   (d) None of these

5. The viscous forces, F is

   (a) $6\pi \eta r \upsilon$ (b) $6\pi\eta r^2\upsilon$

   (c) $6\pi\eta r^2\upsilon^2$ (d) $6\pi\eta r \upsilon^2$

6. The lubricants have ———— coefficient of Viscosities.

(a) Low (b) Negative

(c) High (d) None of these

7. The unit of angular momentum is

(a) $kg.m.s^{-1}$ (b) $kg.m^2.s^{-1}$

(c) $kg^{-1}.m^2.s$ (d) $kg.m^{-2}.s^{-1}$

8. Work is a ———— quantity.

(a) Vector (b) Scalar

(c) Vector and scalar (d) None of these

9. The working principle of a rocket is based on

(a) Newton's first law of motion

(b) Newton's second law of motion

(c) Newton's third law of motion

(d) None of these

10. The Ventriometer works on the principle of ————

(a) Bernoulli's theorem

(b) Boyle's law

(c) Newton's third law

(d) None of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) A steel wire 5m long and of diameter 5mm is stretched by a load of 5kg. Find the elongation of the wire. Young's modulus $q = 2.4 \times 10^{11}$ Pascal; $g = 9.8\, ms^{-2}$.

Or

(b) Write a short note on torsional Oscillations of a body.

12. (a) Distinguish uniform and non-uniform bending.

Or

(b) Derive an expression for the depression of a cantilever.

13. (a) What are the applications of a capillary rise?

Or

(b) Derive an expression for excess of pressure of a spherical bubble.

14. (a) State and explain work-energy theorem.

Or

(b) State and explain the types of energy.

6. The lubricants have ———— coefficient of Viscosities.

(a) Low (b) Negative

(c) High (d) None of these

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(a) $kg.m.s^{-1}$ (b) $kg.m^2.s^{-1}$

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13. (a) What are the applications of a capillary rise?

Or

(b) Derive an expression for excess of pressure of a spherical bubble.

14. (a) State and explain work-energy theorem.

Or

(b) State and explain the types of energy.

15. (a) Derive an expression for the centre of pressure on a triangular lamina.

Or

(b) Explain the determination of meta-centric height of a ship.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Obtain the relation between the elastic constants.

Or

(b) Describe the experiment to find the Young's modulus of a given bar using uniform bending.

17. (a) Explain the determination of Young's modulus using Cantilever.

Or

(b) Derive an expression for the Young's modulus of a beam by non-uniform bending.

18. (a) Define : excess of pressure. Explain the applications of excess of pressure to soap bubbles.

Or

(b) Derive the Poiseuille's formula for the coefficient of viscosity of a liquid.

19. (a) Define : Work and energy. State and prove work-energy theorem.

Or

(b) Derive an expression for the moment of inertia of a diatomic molecule and its rotational kinetic energy.

20. (a) State and prove Bernoulli's theorem.

Or

(b) Explain the working of Pitot's tube.

———————

ges) Reg. No. :.....

ode No. : 30620 E **Sub. Code : CMPH 21**

. (CBCS) DEGREE EXAMINATION, APRIL 2022.

Second Semester

Physics — Core

OPTICS AND ACOUSTICS

(For those who joined in July 2021 onwards)

: Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

The dispersive power of prism depends upon

(a) the shape of the prism

(b) the material of the prism

(c) the angle of the prism

(d) height of the prism

2. The reciprocal of dispersive power is called

(a) constringence

(b) dispersive power

(c) dispersion

(d) angular dispersion

3. The effective path difference in colour of thin film is

(a) $\frac{\lambda}{2}$ (b) $2\,\mu t\,cos\,r$

(c) $2\,\mu t\,cos\,r + \frac{\lambda}{2}$ (d) $\mu t\,cos\,r + \frac{\lambda}{2}$

4. The radius of the dark ring is proportional to

(a) $\sqrt{r}$ (b) $\sqrt{Rn}$

(c) $\sqrt{n}$ (d) $\sqrt{nR\lambda}$

5. The easiest pattern observed by the spectrometer is

(a) Fresnel (b) Fraunhofer

(c) Newton (d) Thomas Young

The most common optically active substance is

(a) Salt (b) Sugar

(c) Quartz (d) Sodium Chloride

The Intensity of sound will be depends on

(a) frequency (b) amplitude

(c) angular frequency (d) velocity

The frequencies of the harmonies of a string are

(a) of the same pitch (b) unrelated

(c) in the ratio 1:3:5 (d) in the ratio 1:2:3

Ultrasonic wave carry more

(a) energy only (b) frequency only

(c) heat (d) energy & frequency

The relationship between speed (v) frequency (f) wavelength (λ) is

(a) $Vf = \lambda$ (b) $f\lambda = V$

(c) $V\lambda = f$ (d) $V = \lambda/f$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain how will you minimize spherical aberration in a lens

Or

(b) Distinguish between Ramsden eyepiece and Huygen's eyepiece.

12. (a) Determine the diameter of a thin wire using a air wedge.

Or

(b) Discuss the theory of Newton's rings method.

13. (a) Explain the method of Nicol Prism used as an analyser.

Or

(b) Explain the working and uses of quarter wave plate.

14. (a) What are forced vibrations. Discuss the phenomenon of reasonance.

Or

(b) Explain how the diameters of two wires can be compared using sonometer.

15. (a) Explain the requisites of good acoustics of building.

Or

(b) Write down any five applications of ultrasonic wave.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the refraction through a thin prism.

Or

(b) Explain the construction and working of Gauss eye piece.

17. (a) Explain the theory of interference fringes.

Or

(b) Explain Michelson interferometer with a neat diagram.

18. (a) Obtain the expression for fresnel diffraction at a narrow wire.

Or

(b) Explain the production and detection of plane elliptical and circularly polarised light.

19. (a) Give the theory of Helmholtz resonator and find an expression for its fundamental frequency.

Or

(b) Explain Melde's experiment for transverse and Longitudinal vibrations.

20. (a) What are ultrasonics. Describe in detail one method of their production and defection.

Or

(b) Explain what causes reverberation in a hall and how it can be minimized.

———————

(6 pages) Reg. No. : .....

Code No. : 20390 E **Sub. Code : CMPH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Second Semester

Physics – Core

OPTICS AND ACOUSTICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which ray is least deviated by a prism

(a) Violet ray

(b) Green ray

(c) Red ray

(d) Yellow ray

2. The spherical aberration can be reduced

(a) By using suitable stops

(b) By suitable combination of covex and concave lens

(c) By using plano convexlens

(d) All

3. By the principle of interference for constructive interference the path difference is

(a) λ (b) π

(c) $n\lambda$ (d) $\lambda/2$

4. An important application of interference in thin film is

(a) Grating (b) Newton's ring

(c) Zone plate (d) Sun glasses

5. The resolving power of a grating

(a) $\frac{nN+1}{\lambda}$ (b) $\frac{nN}{\lambda}$

(c) nN (d) $\frac{nN}{\lambda}+1$

6. The phase difference of the emerging wave in quarter wave plate.

(a) 90° (b) 180°

(c) 270° (d) 360°

7. A frequency of 1HZ corresponds to

(a) 1 vibration per sec

(b) 2 vibrations per sec

(c) 10 vibration

(d) a time period of A½ second

8. Periodic vibrations of decreasing amplitude are called

(a) damped vibrations (b) over vibrations

(c) critical vibrations (d) forced oscillations

9. Ultrasonic waves cannot be heard

(a) through speakers (b) through crystals

(c) insidemetal sheet (d) through rubber tubes

10. Reverberation time is directly proportional to

(a) Effective surface area

(b) Lateral surface area

(c) Volume of the area

(d) Shape of the room

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Briefly explain spherical aberration in a lens.

Or

(b) Define dispersive power. Explain dispersion without deviation.

12. (a) What is meant by interference of light? Describe the production of interference fringes.

Or

(b) What are Newton's rings and Describe how are they formed?

13. (a) Write the comparison between Fresnel and Fraunhofer diffraction.

Or

(b) Distinguish between polarised and unpolarized light.

14. (a) Distinguish between free and forced vibrations.

Or

(b) Discuss the characteristics of musical sound.

15. (a) Describe magnetostriction method of production of ultrasonics.

Or

(b) Derive the expression for the intensity of sound.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Explain the dispersive power of a prismand deviation without dispersion.

Or

(b) Explain constant deviation spectroscope.

17. (a) Explain Air wedge experiment testing the plainness of surfaces.

Or

(b) Write the applications of Michelson interferometer.

18. (a) Discuss the diffraction of light by single slit.

Or

(b) Explain Fresnel's theory of optical activity.

19. (a) Discuss the Laws of transverse vibration of a stretched string and explain how the diameter of two wires can be compared using sonometer.

Or

(b) What are damped oscillations? Discuss analytically the motion of a particle executing damped simple harmonic oscillations.

20. (a) Explain how ultrasonics are produced in a piezoelectric method.

Or

(b) Describe with theory a method of measuring the absorption coefficient of a material.

———————

(6 pages)

Reg. No. : .....

Code No. : 20391 E **Sub. Code : CMPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Physics — Core

ELECTRICITY AND ELECTROMAGNETISM

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Operation of thermocouple is governed by ———
   (a) Peltier effect (b) Seeback effect
   (c) Thomson effect (d) All of the mentioned

2. Coulomb is the unit of
   (a) Field strength (b) Charge
   (c) Capacitor (d) Force

3. The terminal potential difference will be greater than its emf when it is
   (a) in open circuit
   (b) being charged
   (c) discharged
   (d) being charged or discharged

4. In a series resonance circuit, series resonance occurs when
   (a) $X_L = 1$ (b) $X_C = 1$
   (c) $X_L = X_C$ (d) $X_L = -X_C$

5. Which of the following is a vector quantity?
   (a) Relative permeability
   (b) Magnetic field intensity
   (c) Flux density
   (d) Magnetic potential

6. Biot Savart law in magnetic field is analogous to
   (a) Gauss law (b) Faraday law
   (c) Coulomb's law (d) Ampere law

7. The self inductance associated with a coil is independent of?
   (a) induced voltage (b) current
   (c) time (d) coil resistance

8. What is measured by the eddy current induced in energy meters?
   (a) Electric potential
   (b) Electric induction
   (c) Electric power
   (d) Electric energy

9. In electromagnetic waves the phase difference between electric and magnetic field vectors are
   (a) zero (b) $\pi/4$
   (c) $\pi/2$ (d) π

10. The EM waves when travel into different media gets
    (a) refracted (b) transmitted
    (c) reflected (d) emitted

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Define electric potential. Write relation connecting electric field and potential.

    Or

    (b) State and explain Faraday's law of electrolysis.

12. (a) State ohms law : Kirchoff's law.

    Or

    (b) Derive an expression for LCR series resonance circuit.

13. (a) Write the relation between M, B and H.

    Or

    (b) Obtain an expression for Lorentz force on a moving charge.

14. (a) Describe coefficient of coupling in mutual inductance.

    Or

    (b) Write a note on induction oil.

15. (a) Write short note on poynting vector. Discuss significance of poynting vector.

    Or

    (b) Describe the reflection and transmission at normal incidence in EM waves.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Define see back effect. Explain the measurement of thermo emf using potentiometer.

Or

(b) Explain Kohlrausch's bridge method for determining the specific conductivity of a electrolyte.

17. (a) Describe growth and decay of charge in LCR circuit.

Or

(b) Define term power factor. Describe how you would determine the power factor load in an AC circuit.

18. (a) Obtain relation between magnetic flux and magnetic induction.

Or

(b) Explain B - H curve.

19. (a) Define self inductance. Explain determination of L by Owen's bridge.

Or

(b) Write short note :

(i) Rotating magnetic field

(ii) Eddy current.

20. (a) Explain displacement current equation.

Or

(b) Derive wave equations for electric field and magnetic field.

———————

(6 pages) **Reg. No. :** .....

Code No. : 20398 E **Sub. Code : CNPH 32**

U.G. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Physics

Non Major Elective — APPLIED PHYSICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following is an example for primary energy source?
   (a) Solar energy
   (b) Wind energy
   (c) Coal energy
   (d) None

2. Conventional energy source are also known as
   (a) Conventional (b) Non-commercial
   (c) Non-conventional (d) None

3. Fossil fuel is also known as
   (a) Lubricating fuel (b) Liquid fuel
   (c) Solid fuel (d) Mineral fuel

4. The percentage of global fossil fuel reserves are found in India is
   (a) 20% (b) 17%
   (c) 6.85% (d) 4%

5. Biomass is a ———— energy source.
   (a) Renewable (b) Non renewable
   (c) Thermal (d) None

6. In biogas mixture containing ————% of CO2.
   (a) 30 to 40 (b) 10 to 15
   (c) 5 (d) 2

7. Which of the following is not a green house ————
   (a) CO_2 (b) CH_4
   (c) CFC (d) H_2

8. Solar radiation consists of
   (a) Infra-red region
   (b) Ultraviolet region
   (c) Both (a) and (b)
   (d) None of these

9. "Earth day" is celebrated on
   (a) 1st December
   (b) 5th June
   (c) 22nd April
   (d) 1st January

10. Taj Mahal at Agra may be damaged by
    (a) Sulphur dioxide (b) Chlorine
    (c) Hydrogen (d) Oxygen

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe about conventional energy source.

Or

(b) Write down the advantages of renewable energy source.

12. (a) Describe the types of power in Fossil fuels.

Or

(b) Write briefly statistical details in fossil fuels.

13. (a) Write a short note on Biomass energy.

Or

(b) Write any five advantages and disadvantages of biomass energy.

14. (a) Describe the operations of a solar pond.

Or

(b) Write the principle for a solar cell.

15. (a) Explain the advantages of geothermal energy.

Or

(b) State the principle of wind energy conversion.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Write an essay about various forms of energies.

Or

(b) Write an essay about renewable and conventional energy sources.

17. (a) Discuss about the various availability of energy resources.

Or

(b) Write briefly application of fossil fuels.

18. (a) Write an essay about the generation of biomass energy.

Or

(b) Explain about Deena Bandhu model gas plant.

19. (a) Write briefly notes for applications of solar energy.

Or

(b) Explain its merits and limitations for a solar cooker.

20. (a) Write an essay about geo thermal energy.

Or

(b) Describe the principle and working of OTEC system.

———————

(6 pages)

Reg. No. : .....

Code No. : 20395 E **Sub. Code : CSPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Physics

Skill Based Subject — MAINTENANCE OF ELECTRICAL APPLIANCES

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. An ammeter is connected is ———— with the circuit.
   (a) parallel
   (b) series
   (c) parallel or series
   (d) none of these

2. Calculate the number of units of electricity used if a bulb of 100 W is kept on for 5 hours.
   (a) 1 unit (b) 0.1 unit
   (c) 5 unit (d) 0.5 unit

3. For short circuit test and open circuit test of transformers, the instruments are connected on ————
   (a) LV side and HV side respectively
   (b) HV side and LV side respectively
   (c) HV side only
   (d) LV side only

4. Auto transformer is used in transmission and distribution when ————
   (a) operator is not available
   (b) iron losses are to be reduced
   (c) efficiency consideration is ignored
   (d) transformation ratio is small

5. In refrigerators, for obtaining high coefficient of performance, the pressure range of compressor should be ————
   (a) high (b) low
   (c) optimum (d) any value

6. Which of the following is used in automatic control of street lights?

(a) thermistor (b) photoconductor

(c) transistor (d) thermostat

7. Which of the following statements is incorrect for alternating current?

(a) it can be transmitted over long distance

(b) its production is cheape

(c) it has a constant value

(d) its voltage can be easily changed

8. In wiring system, cheapest and simple method is _____

(a) Cleat wiring

(b) PVC sheath wire

(c) Lead connected wiring

(d) Wooden casing capping wiring

9. What is the major cause of the failure of the circuit breaker?

(a) trip circuit open

(b) trip latch defective

(c) spring defective

(d) all

10. Flemmings right hand rule is used to find the _____

(a) direction of rotation

(b) direction of flux

(c) direction of emf

(d) direction of torque

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain the flow of electrons in a conductor and current direction.

Or

(b) Describe the measurement of resistance and voltage using a multimeter.

12. (a) Compare core type and shell type transformers.

Or

(b) Discuss the various methods used to cool transformers.

13. (a) Describe a fluorexent lamp and explain its working.

Or

(b) Explain the construction and working of voltage stabiliser.

14. (a) Write the differences between single phase and three phase connection.

Or

(b) Explain electrical circuit overloading.

15. (a) Write the different types of fuses, their rating and specific uses.

Or

(b) Give the principle of an electric motor and explain a DC motor.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Describe the various forms of resistors.

Or

(b) Describe the conversion of galvanometer into voltmeter.

17. (a) Write in detail about the classifications of transformers.

Or

(b) Define : transformer. Mention the sources of energy loss in a transformer.

18. (a) Explain the various parts of a wet grinder and explain their functioning.

Or

(b) With neat sketch, explain the construction and working of electric iron box.

19. (a) Describe star connection and delta connection with neat wiring diagram.

Or

(b) Explain (i) electrical short circuiting (ii) colour code for insulating wires.

20. (a) Describe with a neat sketch, a relay and its functioning.

Or

(b) Explain the function of an UPS with neat sketch.

PART C — (5 × 8 = 40 marks)

wer ALL questions, choosing either (a) or (b).

Answer should not exceed 600 words.

) State and explain Kirchhoff's first and second laws.

Or

) Derive the expression for the condition for bridge balance in a Wheatstone Bridge.

) Obtain an expression for the self inductance of a long solenoid.

Or

) Explain the determination of mutual inductance between a pair of coils using Ballistic Galvanometer.

a) Explain the characteristics of zener diode. How it is used as a voltage regulator?

Or

b) State and explain DeMorgan's theorems.

(a) What are nuclear forces? Give their properties.

Or

(b) State and explain Soddy – Fajan's displacement law.

(a) Prove that the path of the projectile is a parabola.

Or

(b) Derive the Lorentz transformation equations.

Reg. No. : .....

Code No. : 30040 E **Sub. Code : JAPH 21/ SAPH 21/AAPH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2022.

Second/Fourth Semester

Physics — Allied

PHYSICS – II

(For those who joined in July 2016 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The material through which electric charge can easily flow is _____.

(a) Quartz (b) Mica

(c) Germanium (d) Copper

2. If three 2Ω resistances are connected in series, the effective resistance will be

(a) 0 (b) 6Ω

(c) 8Ω (d) 2Ω

3. The relation connecting magnetic induction (B) and magnetic field intensity (H) is _____.

(a) $\mu = B/H$ (b) $\mu = BH$

(c) $\mu = H/B$ (d) None

4. The coefficient of mutual inductance between a pair of coils _____, if the number of turns is high.
   (a) high (b) small
   (c) 0 (d) none
5. In the reverse bias of a diode, the resistance is _____.
   (a) very high (b) small
   (c) 0 (d) none
6. The binary equivalent for the decimal number 7 is _____.
   (a) 110 (b) 101
   (c) 111 (d) 001
7. Isotopes have _____ atomic number and _____ mass number.
   (a) different-same (b) same-different
   (c) same-same (d) none
8. In the nuclear reaction $_{92}U^{234} + X \rightarrow {}_{92}U^{235} + \gamma$, X stands for
   (a) proton (b) electron
   (c) neutron (d) none
9. The horizontal distance covered by a projectile is large, if it is projected with an angle _____.
   (a) 30° (b) 60°
   (c) 45° (d) none
10. The mass of the particle travelling with velocity of light will be _____.
   (a) 0 (b) infinity
   (c) 100 kg (d) none

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) State and explain ohm's law.

Or

(b) Explain the conversion of galvanometer into a volt meter.

12. (a) What are diamagnetic materials? Give any three properties of them.

Or

(b) State and explain Lenz's law.

13. (a) Explain the V-I characteristics of Junction diode.

Or

(b) Draw the symbol and truth table for a NOR gate.

14. (a) Define mass defect and binding energy.

Or

(b) What are the fundamental laws of radioactivity?

15. (a) Derive the expression for the horizontal range of a projectile.

Or

(b) What are the postulates of special theory of relativity?

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(6 pages) Reg. No. :.....

Code No. : 20042 E **Sub. Code : SAPH 21/ AAPH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Second / Fourth Semester

Physics — Allied

ALLIED PHYSICS — II

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Current density J is equal to

(a) $\frac{I}{A}$ (b) IA

(c) $\frac{A}{I}$ (d) Am^2

2. If resistance decreases then current will

(a) Increase (b) Double

(c) Decrease (d) Constant

3. Permeability μ is equal to

(a) $\mu = \frac{B}{H}$ (b) $B = \mu H$

(c) $B = \mu_r \mu_o H$ (d) All

4. The unit of magnetic induction is

(a) tesla (b) $Webm^{-2}$

(c) Both (a) and (b) (d) None

5. I_E =

(a) $I_C \times I_B$ (b) $\frac{I_B}{I_C}$

(c) $I_B + I_C$ (d) None

6. $\overline{A \cdot B}$

(a) $\overline{A} + \overline{B}$ (b) $\overline{A} \cdot \overline{B}$

(c) $\overline{B} \cdot \overline{A}$ (d) None

7. The radioactive elements emits

(a) Electrons (b) Positrons

(c) γ - rays (d) All

8. The relation between half – life time (τ) and mean life (τ) of a radioactive substance is

(a) $\tau = 2.718\ T$ (b) $0.693\ T$

(c) $T = 0.693$ (d) $\tau = \frac{T}{2}$

9. The equation for length contraction is

(a) $L = I_0\left(1 - v^2\right)$ (b) $L = \frac{I_0}{1 - v^2}$

(c) $L = I_0\sqrt{\frac{1 - v^2}{c^2}}$ (d) $\frac{\sqrt{1 - v^2}}{c^2}$

10. Time of flight T =

(a) $\frac{2U \sin \alpha}{g}$ (b) $\frac{U \sin 2\alpha}{g}$

(c) $\frac{x}{U \cos \alpha}$ (d) $\frac{U \cos \alpha}{2g}$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive the expression for current density.

Or

(b) Discuss the conversion of Galvanometer into ammeter.

12. (a) Write the relation connecting M, B, H.

Or

(b) Describe the coefficient of coupling.

13. (a) Explain V-I characteristics of Zenerdiode.

Or

(b) Explain AND, OR, NOT basic logic gates.

14. (a) Write the general properties of nucleus.

Or

(b) State the explain law of radioactive disintegration.

15. (a) Write a note on path of projectile.

Or

(b) Discuss briefly time dilation.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) State and explain Ohm's law.

Or

(b) State and explain Kirchoff's law.

17. (a) Explain Magnetic permeability and magnetic susceptibility $(\mu \text{ and } K)$.

Or

(b) Explain determination of mutual induction using BG.

18. (a) Describe the common emitter characteristics of a transistor.

Or

(b) State and prove Demorgan's theorem.

19. (a) Explain binding energy curve.

Or

(b) Explain Soddy Fajan displacement law.

20. (a) Explain range on the horizontal plane.

Or

(b) Derive Lorentz transformation equation.

———————

pages) **Reg. No. :** .....

ode No. : 30333 E **Sub. Code : SEPH 6B**

.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2022.

Sixth Semester

Physics — Major Elective

ENERGY PHYSICS

(For those who joined in July 2017 onwards)

me : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

Which of the following is a non-reneweable resources?

(a) coal (b) forests

(c) water (d) wildlife

Boiling water reactor and pressurized water reactors are _____

(a) Nuclear reactor (b) Solar reactor

(c) Thermal reactor (d) Biogas reactor

The following type of energy is started as lateant heat

(a) Thermal energy (b) Chemical energy

(c) Electrical energy (d) Mechanical energy

The value of solar constant is

(a) 1347 w/m² (b) 1357 w/m²

(c) 1367 w/m² (d) 1388 w/m²

The outermost layer of the earth is

(a) Magma (b) Mantle

(c) Crust (d) None of the above

2. Photovoltaic energy is few conversion of sunlight into

(a) Chemical energy (b) Biogas

(c) Electricity (d) geothermal energy

3. Horizontal axis and vertical axis are the types of

(a) Nuclear reactor (b) Wind mills

(c) Biogas reactor (d) Solar cell

4. Fuel cells are _____

(a) Carbon cell (b) Hydrogen battery

(c) Nuclear cell (d) Chromium cell

5. Common energy source in Indian villages is

(a) Electricity (b) Coal

(c) Sun (d) Wood and animal dung

6. Crude oil is _____

(a) Colorless

(b) Odorless

(c) Smelly yellow to black liquid

(d) Odorless Yellow to black liquid

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain in details about the Conventional Energy resource?

Or

(b) Write any five differences between renewable and non-renewable sources

12. (a) Briefly explain Flate plate collectors?

Or

(b) Write a short notes on Solar water heater?

13. (a) What are the types of solar cell?

Or

Explain in details about the Hybrid system?

14. (a) Explain the construction and working of biogas

Or

(b) What are the advantage and Disadvantages of Biomass energy?

15. (a) What is the basic principle of wind energy conversion and mention the any 3 application

Or

(b) What are the advantages and limitation of tidal power generation

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain in details about the conventional and non-conventional energy resources.

Or

(b) Briefly in details about different categories of Energy sources.

17. (a) Explain the Different types of Solar Collectors?

Or

(b) Explain the construction and working of Solar Cooker?

18. (a) What are the advantage and disadvantages of PV Solar Energy Conversion?

Or

(b) What are the application of solar photovoltaic systems?

19. (a) Explain the conversion of Biomass energy into other form of energy?

Or

(b) What are the advantages & disadvantages of biological conversion of solar energy

20. (a) Explain the fuel cells and application of fuel cells.

Or

(b) Define Wave energy. Explain the energy and power from waves.

———————

...ages)

Reg. No. :.....

...ode No. : 30310 E Sub. Code : SMPH 41 / AMPH 41

...c. (CBCS). DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Physics — Core

ELECTROMAGNETISM

(For those who joined in July 2017 onwards)

...me : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

The self inductance associated with a coil is independent of

(a) Current (b) Induced Voltage

(c) Time (d) Resistance of a coil

Eddy currents do not cause

(a) sparking (b) damping

(c) heating (d) loss of energy

3. Ampere's circuital law is given by

(a) $\phi \vec{H} . d \vec{l} = \mu_0 \vec{I}$ (b) $\phi \vec{B} . d \vec{l} = \mu_0 I$

(c) $\phi \vec{B} . d \vec{l} = \mu_0 J$ (d) $\phi \vec{H} . d \vec{l} = \mu_0 J$

4. The deflection θ is related to the electric current in a galvanometer by the relation

(a) $I \alpha \theta$ (b) $I \alpha \tan\theta$

(c) $I \alpha \sin\theta$ (d) $I \alpha \cos\theta$

5. The correct expression for the pointing vector is

(a) S = E x B (b) S = E x B/2

(c) S = E x B/μo (d) S = E x B/2μo

6. Electromagnetic waves are produced by

(a) A static charge

(b) An accelerated charge

(c) A moving charge

(d) Charged particle

7. The idea of displacement current is due to

(a) ampere (b) Faraday

(c) Gauss (d) Maxwell

For air the refractive index of light is ___

(a) 1 (b) 2

(c) very close to 1 (d) 0

Earth resistance in a typical domestic wiring is

(a) Less than 5 ohms (b) around 100 ohms

(c) very large (d) around 1000 ohms

Ballistic galvanometer are principally used for the measurement of

(a) current (b) voltage

(c) power (d) electric charges

PART B — (5 × 5 = 25 marks)

...nswer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

(a) Define

(i) Self inductance

(ii) Mutual inductance

Or

(b) Describe the theory of eddy currents

12. (a) State and prove ampere's circuital law

Or

(b) Derive an expression torque on a current loop at a uniform magnetic field

13. (a) Define

(i) Hysteresis

(ii) Coercivity

Or

(b) Write short notes on

(i) Displacement current

(ii) Poynting vector

14. (a) Discuss briefly energy and Momentum in electromagnetic

Or

(b) Discuss the enrgy relations of electro-magnetic waves

15. (a) Describe the measurement of horizontal component of the earth's magnetic field

Or

(b) Explain the calibration of BG.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the determination of self inductance by Owen's bridge

Or

(b) Explain the experimental determination of mutual inductance between a pair of coils using BG

17. (a) Explain the Biot-savart law and Ampere's law and discuss their importance in electromagnetism

Or

(b) Describe an experiment to find charge sensitivity and absolute capacity of a capacitor

18. (a) Describe the three magnetic vectors M, B, and H obtain relation between them

Or

(b) Explain Hertz experiment for production and detection of EM Waves

19. (a) Derive wave equation for Electric field and Magnetic field

Or

(b) Define term

(i) Total internal reflection and

(ii) Polarization

20. (a) Outline the uses of Earth inductor

Or

(b) Discuss briefly induction coil and uses

———————

(6 pages) Reg. No. : .....

Code No. : 20033 E **Sub. Code : SMPH 41/ AMPH 41**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fourth Semester

Physics — Core

ELECTROMAGNETISM

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Electromagnetic induction is not used in ———
   (a) Transformer (b) Room heater
   (c) AC generator (d) Choke coil

2. The self inductance of a straight conductor is ———
   (a) zero (b) infinity
   (c) very large (d) very small

3. The S.I unit of magnetic flux density
   (a) T (b) wb/m^3
   (c) wb (d) wb/m

4. The magnitude of magnetic Lorentz force is ———
   (a) $\vec{F} = q\vec{E}$ (b) $\vec{F} = q(\vec{V} \times \vec{B})$
   (c) $F = Bqv\sin\theta$ (d) $\vec{F} = q\left[(\vec{V} \times \vec{B}) + \vec{E}\right]$

5. Unit of magnetization is ———
   (a) Am (b) Am^{-3}
   (c) Am^{-1} (d) Am^{-2}

6. Velocity of plane electro magnetic wave in vaccum is
   (a) $c = \sqrt{\mu_0 / \varepsilon_0}$ (b) $c = \sqrt{\mu_0 \varepsilon_0}$
   (c) $c = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ (d) $c = \sqrt{\varepsilon_0 / \mu_0}$

7. Polarization shows the ——— nature of light.
   (a) Longitudinal (b) Transverse
   (c) Dual (d) None

8. Brewster angle is ———
   (a) $\tan^{-1}(n)$ (b) $\tan^{-1}\left(\frac{n_1}{n_2}\right)$
   (c) $\tan^{-1}\left(\frac{n_2}{n_1}\right)$ (d) $\tan(n)$

9. The horizontal component of earth's magnetic induction at our place is ———
   (a) 0.3×10^{-3}T (b) 0.38×10^{-4}T
   (c) 1.38×10^{-4}T (d) 0.38 T

10. Charge sensitivity of B.G is ———
    (a) V/div (b) A/div
    (c) C/div (d) J/K

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) State Faraday's laws of electromagnetic induction.

    Or

    (b) Obtain on expression for the self-inductance of a long solenoid.

12. (a) Applying Ampere's circuital law, find the magnetic induction due to a toroid.

    Or

    (b) Explain the Lorentz force on a moving charge.

13. (a) Describe Hertz experiment to produce electromagnetic waves.

    Or

    (b) Obtain the relation connecting magnetic permeability (μ) and susceptibility (K).

14. (a) Derive an expression for the velocity of electromagnetic waves.

    Or

    (b) Explain the polarization of electromagnetic waves by reflection.

15. (a) What are the application of induction coil?

    Or

    (b) Explain the method of calibration of Ballistic galvanometer using earth inductor.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Obtain the expression for the self inductance of a toroidal solenoid.

Or

(b) Describe the theory of Anderson's bridge method of finding self inductance of a coil.

17. (a) Deduce the expression for the force on a current carrying conductor placed in a magnetic field.

Or

(b) Explain in detail the principle, construction and the theory of moving coil ballistic galvanometer.

18. (a) Derive an expression for pointing vector.

Or

(b) Derive an expression for wave equation for electromagnetic wave in free space.

19. (a) Derive the wave equation for magnetic and electric field in a non-conducting medium.

Or

(b) Discuss the reflection and transmission of electro magnetic wave at a dielectric boundary for normal incidence.

20. (a) Explain the method of measurement of intense magnetic field using search coil and ballistic galvanometers.

Or

(b) Describe an induction coil and explain its working.

(6 pages) Reg. No. : .....

Code No. : 20034 E **Sub. Code : SMPH 51**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fifth Semester

Physics — Main

BASIC ELECTRONICS

(For those who joined in July 2017–2019)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In Nortan's current source
   (a) Short the load resistor
   (b) Disconnect the load resistor
   (c) Short the voltage source
   (d) Open the voltage source

2. In ideal current source the output current is
   (a) zero
   (b) constant
   (c) dependent on load
   (d) dependent on internal resistance

3. For break down in zener diode the requirement is
   (a) forward bias
   (b) reverse bias
   (c) both forward and reverse bias
   (d) none

4. The ac beta given by β_{ac} = _____
   (a) $\Delta I_C / \Delta I_B$ (b) $\Delta I_C \times \Delta I_B$
   (c) $\Delta I_E / \Delta I_B$ (d) $\Delta I_E \times \Delta I_B$

5. A MOSFET has _____ terminals.
   (a) two (b) five
   (c) four (d) three

6. In a P - channel JFET, the charge carriers are
   (a) electrons
   (b) holes
   (c) both electrons and holes
   (d) none of these

7. The common mode gain is
   (a) very high (b) very low
   (c) always unity (d) unpredictable

8. In a Colpitt's oscillator, the feedback is obtained
   (a) by magnetic induction
   (b) by a tickler coil
   (c) from the center of split capacitors
   (d) none of these

9. In ideal op - amp the I/P impedance is _____
   (a) infinite (b) zero
   (c) 1 (d) constant

10. The gain of an actual op - amp is around
    (a) 10,00,000 (b) 1,000
    (c) 100 (d) 15 V

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) State and Explain Norton's theorem.

Or

(b) How will you determine the h-parameters of a linear circuit?

12. (a) Describe the working of P – N junction diode discuss its uses.

Or

(b) Define stability factor. Derive an expression for it.

13. (a) Write a note on JFET connections.

Or

(b) Explain the operation of JFET as an amplifier.

14. (a) Using a circuit diagram explain the working of Hartley oscillator.

Or

(b) With a neat circuit diagram, describe the working of a transistor crystal oscillator.

15. (a) Explain band width and slew rate of an op - amp.

Or

(b) Discuss the action of inverting amplifier.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) State and explain Thevenin's theorem.

Or

(b) State and explain maximum power transfer theorem.

17. (a) Describe the V – I characteristics of P – N junction diode.

Or

(b) Discuss the characteristics of a transistor in CE mode.

18. (a) Describe the working characteristics of UJT.

Or

(b) Explain the operation of push - pull amplifier with circuit.

19. (a) Outline the general theory of feedback.

Or

(b) What is monostable multivibrator? Explain its working with a neat circuit diagram.

20. (a) Discuss A.C analysis of OP-AMP.

Or

(b) Describe the operation of a differential amplifier. Derive an expression for the CMRR.

———————

(6 pages) Reg. No. : .....

Code No. : 20034 E **Sub. Code : SMPH 51**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fifth Semester

Physics — Main

BASIC ELECTRONICS

(For those who joined in July 2017–2019)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. In Nortan's current source
   (a) Short the load resistor
   (b) Disconnect the load resistor
   (c) Short the voltage source
   (d) Open the voltage source

2. In ideal current source the output current is
   (a) zero
   (b) constant
   (c) dependent on load
   (d) dependent on internal resistance

3. For break down in zener diode the requirement is
   (a) forward bias
   (b) reverse bias
   (c) both forward and reverse bias
   (d) none

4. The ac beta given by β_{ac} = _____
   (a) $\Delta I_C / \Delta I_B$ (b) $\Delta I_C \times \Delta I_B$
   (c) $\Delta I_E / \Delta I_B$ (d) $\Delta I_E \times \Delta I_B$

5. A MOSFET has _____ terminals.
   (a) two (b) five
   (c) four (d) three

6. In a P - channel JFET, the charge carriers are
   (a) electrons
   (b) holes
   (c) both electrons and holes
   (d) none of these

7. The common mode gain is
   (a) very high (b) very low
   (c) always unity (d) unpredictable

8. In a Colpitt's oscillator, the feedback is obtained
   (a) by magnetic induction
   (b) by a tickler coil
   (c) from the center of split capacitors
   (d) none of these

9. In ideal op - amp the I/P impedance is _____
   (a) infinite (b) zero
   (c) 1 (d) constant

10. The gain of an actual op - amp is around
    (a) 10,00,000 (b) 1,000
    (c) 100 (d) 15 V

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) State and Explain Norton's theorem.

Or

(b) How will you determine the h-parameters of a linear circuit?

12. (a) Describe the working of P – N junction diode discuss its uses.

Or

(b) Define stability factor. Derive an expression for it.

13. (a) Write a note on JFET connections.

Or

(b) Explain the operation of JFET as an amplifier.

14. (a) Using a circuit diagram explain the working of Hartley oscillator.

Or

(b) With a neat circuit diagram, describe the working of a transistor crystal oscillator.

15. (a) Explain band width and slew rate of an op - amp.

Or

(b) Discuss the action of inverting amplifier.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) State and explain Thevenin's theorem.

Or

(b) State and explain maximum power transfer theorem.

17. (a) Describe the V – I characteristics of P – N junction diode.

Or

(b) Discuss the characteristics of a transistor in CE mode.

18. (a) Describe the working characteristics of UJT.

Or

(b) Explain the operation of push - pull amplifier with circuit.

19. (a) Outline the general theory of feedback.

Or

(b) What is monostable multivibrator? Explain its working with a neat circuit diagram.

20. (a) Discuss A.C analysis of OP-AMP.

Or

(b) Describe the operation of a differential amplifier. Derive an expression for the CMRR.

———————

ages)

Reg. No. : .....

ode No. : 30314 E Sub. Code : SMPH 61

. (CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Physics — Core

DIGITAL ELECTRONICS

(For those who joined in July 2017 onwards)

Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

The hexadecimal number corresponding to the binary number $(11110010)_2$ is

a) F5 (b) C2

c) F2 (d) C5

The gray code corresponding to binary $(1100)_2$ is

a) 1011 (b) 1001

c) 0111 (d) 1010

ircuit that changes a code into a set of signals alled

encoder (b) decoder

multiplexer (d) dataselector

ecimal counter has ———— states.

5 (b) 10

15 (d) 20

error in the D/A converter output may be due

Errors in the values of resistors used

Monotoncity

Small resolution

Its higher D/A speed

PART B — (5 × 5 = 25 marks)

swer ALL questions, choosing either (a) or (b).

h answer should not exceed 250 words.

Encode the decimal number to excess – 3 code.

(i) 46

(ii) 327.89

(iii) 20.305.

Or

3. The Boolean equation $\overline{\overline{A}+\overline{B}+\overline{C}}$ is equivalent to

(a) A B C (b) A + B + C

(c) $\overline{A}\cdot\overline{B}\cdot\overline{C}$ (d) $\overline{A+B+C}$

4. The most suitable gate for comparing two bits is

(a) AND (b) OR

(c) NAND (d) EX-NOR

5. The flip flop which produces unpredictable output for the inputs 1, 1 is

(a) R – S flipflop (b) J – K flipflop

(c) M – S flipflop (d) D flipflop

6. Circuit which consist of a quasistable state is called

(a) bistable circuit (b) monostable circuit

(c) tristable circuit (d) tristate circuit

7. Four adjacent '1"s in a Karnaugh map forms a

(a) Octet (b) Singlet

(c) Pair (d) Quad

(b) Determine the decimal numbers represented by the following binary numbers.

(i) 110101

(ii) 101101

(iii) 11111111

(iv) 00000000.

12. (a) Describe the positive logic and negative logic systems.

Or

(b) Explain EXOR gate with truth table.

13. (a) Explain the full subtractor with a circuit.

Or

(b) Discuss briefly 555 timer.

14. (a) Explain product of sum (POS) form of logical expression.

Or

(b) Discuss don't care condition.

15. (a) Define (i) shift register (ii) counter.

Or

(b) Define (i) resolution and (ii) linearity of D/A converter.

[P.T.O]

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Perform the following subtraction using 2's complement method.

(i) 01000 – 01001

(ii) 01100 – 00011

(iii) 0011.1001 – 0001.1110.

Or

(b) Explain ASCII code.

17. (a) State and prove Demorgan's theorem.

Or

(b) Explain NOR as universal building block.

18. (a) Explain the operation of a JK flipflop.

Or

(b) Explain monostable multivibrator.

19. (a) Make a K-map for the function

$f = AB + A\overline{C} + C + AD + A\overline{B}C + ABC.$

Or

(b) Explain multiplexer with a diagram.

20. (a) Explain ring counter with a diagram.

Or

(b) Explain term :

(i) resolution

(ii) conversion time of A/D converter.

———————

(6 pages)

Reg. No. : .....

Code No. : 20037 E **Sub. Code : SMPH 61**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Sixth Semester

Physics — Main

DIGITAL ELECTRONICS

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The binary equivalent of the octal number 23 is
   (a) $(010\ 010)_2$ (b) $(101\ 011)_2$
   (c) $(010\ 011)_2$ (d) $(111\ 010)_2$

2. The result of the addition $2_{10} + 5_{10}$ in excess code is
   (a) 1101 (b) 1010
   (c) 1011 (d) 1001

3. Which of the following gates cannot be used as an inverter?
   (a) NAND (b) AND
   (c) NOR (d) EXNOR

4. $AB + \overline{A}C + BC$ is equivalent to
   (a) $AB + BC$ (b) $AB + \overline{A}C$
   (c) $\overline{A}C + BC$ (d) AC

5. How many binary bits are added at a time in a full adder?
   (a) 2 (b) 3
   (c) 4 (d) 6

6. The flip-flop which eliminates the Race condition
   (a) R – S (b) J – K
   (c) T - flipflop (d) Master slave

7. The code used for labeling the cells of the K-map
   (a) Natural BCD (b) Hexadecimal
   (c) Gray (d) Octal

8. A demultiplexer can be used to realize a
   (a) counter
   (b) shift-register
   (c) combinational circuit
   (d) display system

9. BCD counter is also known as
   (a) Parallel counter
   (b) Decade counter
   (c) Synchronous counter
   (d) VLSI counter

10. The percentage resolution of ten bit A/D converter is nearly
    (a) 1% (b) 0.01%
    (c) 0.1% (d) 10%

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Convert the following octal numbers into equivalent decimal number
    (i) 237 (ii) 6327.4051
    (iii) 0.75.

Or

(b) Encode the following decimal number in BCD code.
    (i) 46 (ii) 327.89
    (iii) 20.305.

12. (a) Prove the Boolean identities
    (i) $AC + ABC = AC$
    (ii) $A + \overline{A}B = A + B$.

Or

(b) Describe NOR gate with circuit and truth table.

13. (a) Describe Half subtractor with truth table.

Or

(b) Describe frequency divider in multivibrator.

14. (a) Explain maxterm and minterm in Boolean variables.

Or

(b) Describe decoder with a diagram.

15. (a) Explain Parallel in serial out converter shift register.

Or

(b) Explain MOD-5 counter with a diagram.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Determine the decimal number represented by the following binary number.

(i) 1100.1011

(ii) 1001.0101

(iii) 0.10101.

Or

(b) Explain one's complements and twos complement representation method.

17. (a) What is Boolean algebra? Discuss the fundamental laws of Boolean algebra.

Or

(b) Explain the NOT circuit. Give its truth table and logic symbol.

18. (a) Explain the operation of JK master slave Flipflop.

Or

(b) Explain astable multivibrator with a diagram.

19. (a) Explain :

(i) AND - OR realization

(ii) OR - AND realization.

Or

(b) Explain Demultiplexer with a diagram.

20. (a) Explain setting time and accuracy of D/A converter.

Or

(b) Explain up - down counter with diagram.

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Reg. No. : .....

...ode No. : 30315 E Sub. Code : SMPH 62

... (CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Physics — Core

QUANTUM MECHANICS

(For those who joined in July 2017 onwards)

... Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

The value of Planck's constant h is

(a) 6.226×10^{-27} joule – sec

(b) 6.626×10^{-27} erg – sec

(c) 6.226×10^{-34} erg – sec

(d) 6.626×10^{-34} joule – sec

2. In photoelectric effect, light behaves as

(a) particle (b) wave

(c) radiation (d) heat

3. Which one can't be explained by wave theory of light?

(a) Black body radiation

(b) Compton effect

(c) Photoelectric effect

(d) All the above

4. The two different waves which form a group of waves are

(a) same in amplitude; same in velocity

(b) different in amplitude; same in velocity

(c) same in amplitude; different in velocity

(d) different in amplitude; different in velocity

5. When the position coordinate of a diffracted particle in motion is accurately determined, which one is true?

(a) $\Delta x = 0$ (b) $\Delta x \geq \hbar$

(c) $\Delta p = 0$ (d) $\Delta p \geq \hbar$

Where is the maximum intensity observed in Fraunhoffer diffraction pattern?

(a) in upper band (b) in central band

(c) in bottom band (d) in all the bands

Quantum operator of angular momentum

(a) $-ihr\times\nabla$ (b) $ihr\times\nabla$

(c) $i\hbar\times\nabla$ (d) $-i\hbar\nabla$

Hamiltonian operator is

(a) $\frac{h}{2m}\nabla^2+v$ (b) $\frac{h^2}{2m}\nabla^2+v$

(c) $\frac{-h}{2m}\nabla^2-v$ (d) $\frac{-h^2}{2m}\nabla^2+v$

Outside the box, the value of a wave function is

(a) 1 (b) infinity

(c) zero (d) undetermined

When does the potential energy be zero in a potential barrier?

(a) $L<x<0$ (b) $x=0$

(c) $x<L$ (d) $L>x>0$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Draw and describe the energy distribution curves of a black body at temperatures of 998 K, 1259K, 1449K and 1646K.

Or

(b) A metallic surface emits electrons with energies upto 0.6 eV and 2.04 eV, when illuminated with a light of wavelength 3333 Å and 2400 Å respectively. Calculate the work function of the metal.

12. (a) Derive the relationship between group velocity and phase velocity.

Or

(b) Calculate the wavelength of a wave associated with an electron having energy of 1 MeV.

13. (a) Give the physical significance of position-momentum uncertainty relation.

Or

(b) A microscope located an electron in an atom within a distance of 0.2 Å. Calculate the uncertainty in momentum of that electron.

14. (a) Prove : $\langle p_x x \rangle - \langle x p_x \rangle = \frac{\hbar}{i}$.

Or

(b) Physically interpret the wave function ψ.

15. (a) Calculate the permitted energy levels of an electron in a box of 1×10^{-10} m wide.

Or

(b) Obtain the normalized wave function for the motion of a particle in 1-D box.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the experimental study of the photoelectric effect and results. How did classical physics fail to explain this effect?

Or

(b) Explain the Compton effect.

17. (a) Determine v_g and v_p for a particle moving at relativistic and non-relativistic speeds.

Or

(b) Demonstrate the wave nature of electrons by Davison and Germer's experiment.

18. (a) Calculate the radius of the first Bohr orbit as a consequence of uncertainty relation.

Or

(b) State Heisenberg's uncertainty principle. Prove that $\Delta L . \Delta \phi \geq \hbar$.

19. (a) Prove that uncertainty principle for 1-D wave packet.

Or

(b) Evaluate he quantum operators for Hamiltonian, total energy and angular momentum.

20. (a) Explain the finite square well potential and draw the wave functions for the first three allowed energy levels.

Or

(b) Calculate the Eigen values of the total energy for simple harmonic oscillator. Draw the potential energy curve. Obtain the general formula for the nth wave function.

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Reg. No. : .....

de No. : 30316 E **Sub. Code : SMPH 63**

:. (CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Physics — Core

NUCLEAR PHYSICS

(For those who joined in July 2017 onwards)

: Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

Packing fraction formulae ————

(a) $f = \Delta m/A$ (b) $f = m/A$

(c) $f = A/m$ (d) $f = \Delta A/m$

Mass of the meason 275 × mass of ————

(a) Proton (b) Electron

(c) Neutron (d) Positron

3. Beta particles mass equal to that of a ————

(a) Proton (b) Neutron

(c) Electron (d) Positron

4. Geiger-Nuttal law relation ————

(a) $\log \lambda = A - B \log R$

(b) $\log \lambda = A + B \log$

(c) $\log \lambda = A + \log R$

(d) $\log \lambda = A + B \log R$

5. Nuclear reactor are used in the production of ————

(a) Electricity energy

(b) Wind energy

(c) Hear energy

(d) Thermal energy

6. The safety system protects against intensive Neutron flux and ————

(a) Beta rays (b) Gamma rays

(c) Alpha rays (d) None

he insensitive period of G.M. counter is ————

a) 100 to 200 μ s

b) 300 to 400 μ s

c) 200 to 400 μ s

d) 400 to 500 μ s

n a bubble chamber a vapour bubbles forms in a uperheated ————

a) Vapour (b) Gas

c) Solid (d) Liquid

ast-west effect is maximum at the ————

a) Edge (b) Pole

c) Middle (d) Equator

he variation of cosmic ray intensity with altitude called ————

a) Latitude effect (b) Azimuth Effect

c) Altitude effect (d) None

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the general properties of nucleus.

Or

(b) Describe proton – neutron hypothesis.

12. (a) Explain the term radio carbon dating.

Or

(b) Describe the term nuclear isomers.

13. (a) Describe the term compound nucleus.

Or

(b) Describe the term hydrogen bomb.

14. (a) Explain term synchrocyclotron.

Or

(b) Describe term bubble chamber.

15. (a) Explain the term azimuth effect or east – west effect.

Or

(b) Describe the Van Allen Belts.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the meason theory of nuclear force.

Or

(b) Describe construction and working of liquid drop model.

17. (a) To describe experimental measurement of the range of alpha particles.

Or

(b) Briefly explain the term of laws of successive disintegration.

18. (a) Explain principle and construction and working of atom bomb.

Or

(b) Briefly explain the controlled thermo nuclear reaction.

19. (a) Briefly explain the principle, construction and working of Willson cloud chamber.

Or

(b) Explain the principle, construction and working of cyclotron.

20. (a) Distinguish between latitude and azimuth effect.

Or

(b) Explain the term conservation of laws and symmetry.

———————

(6 pages)

Reg. No. : .....

Code No. : 20039 E **Sub. Code : SMPH 63**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Sixth Semester

Physics — Core

NUCLEAR PHYSICS

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Nuclear binding energy is equivalent to ————

(a) mass of proton

(b) mass of neutron

(c) mass of nucleus

(d) mass defect of nucleus

2. The nuclei having an equal number of neutrons are called ————

(a) isotopes (b) isobars

(c) isotones (d) mirror nuclei

3. Radioactivity is the characteristics of which of the following

(a) nucleus (b) electron

(c) proton (d) neutron

4. What is the half life time of a radioactive substance, if its mean life is 200 seconds?

(a) 0.69 minutes (b) 2 minutes

(c) 2.31 minutes (d) 2.57 minutes

5. A nuclear fission reaction becoming self-sustaining depends on

(a) electrons (b) neutrons

(c) energy (d) protons

6. A nuclear reactor is a device to produce nuclear energy with the help of ————

(a) nuclear fusion

(b) uncontrolled chain reaction

(c) controlled chain reaction

(d) graphite as fuel

7. Scintillation detector is a large flat crystal of which material

(a) Sodium chloride

(b) Sodium iodide

(c) Sodium sulphate

(d) Sodium carbonate

8. Betatron is a machine used to accelerate ————

(a) Protons (b) Neutrons

(c) Electrons (d) All the above

9. Cosmic rays are made up of ————

(a) electrons (b) protons

(c) atomic nuclei (d) all the above

10. Primary cosmic rays are composed largely of very fast ————

(a) protons (b) neutrons

(c) electrons (d) gamma rays

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write a short note on proton - neutron hypothesis.

Or

(b) Explain how the shell model accounts for magic numbers.

12. (a) Give the properties of alpha particles.

Or

(b) Explain the neutrino theory of β – decay.

13. (a) Obtain the Q value for a nuclear reaction.

Or

(b) Explain nuclear fusion reaction.

14. (a) Describe the construction and working of bubble chamber. What are its special features?

Or

(b) Discuss the principle, construction and working of synchrotron.

15. (a) Explain the nature of primary and secondary cosmic rays.

Or

(b) Explain about classifications of elementary particles.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Discuss the general properties of the nucleus.

Or

(b) Explain the meson theory of nuclear forces. Give the characteristics of nuclear forces.

17. (a) Explain the laws of radioactive disintegration.

Or

(b) Discuss radio carbon dating and the laws of successive disintegration.

18. (a) Explain a nuclear reactor and write its uses.

Or

(b) Write about thermonuclear reaction and Explain the confinement of plasma in a fusion reactor.

19. (a) Describe the characteristics of G.M counter and explain the plateau region and dead time of the counter.

Or

(b) Explain the principle, construction and working of a cyclotron. Give its limitations.

20. (a) What are cosmic rays? Write about the origin of cosmic rays.

Or

(b) Explain the four fundamental reactions in nature.

———————

Pages)

Reg. No. : .....

ode No. : 30317 E **Sub. Code : SMPH 64**

Sc. (CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Physics — Core

SOLID STATE PHYSICS

(For those who joined in July 2017 onwards)

e : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

Coordination number for closest packed crystal structure

(a) 16 (b) 12

(c) 8 (d) 4

Most Bravais lattices are of the type

(a) Primitive unit cell

(b) Body centered unit cell

(c) End centered unit cell

(d) Face centered unit cell

Which of the following is Type I superconductor

a) Lead (b) Gold

c) Vanadium (d) Niobium

he transition temperature of mercury is

a) 1 K (b) 1.14 K

:) 4.12 K (d) 9.22 K

mm = ———— nm.

ı) 10^6 (b) 10^{-6}

) 10^7 (d) 10^{-7}

he diameter of bucky ball is about ————

) 1 Å (b) 10 Å

) 100 Å (d) 1000 Å

PART B — (5 × 5 = 25 marks)

wer ALL questions, choosing either (a) or (b).

ach answer should not exceed 250 words.

) Describe the face centered cubic structure.

Or

State and explain Bragg's law.

3. Magnetic susceptibility is positive for

(a) Paramagnetic material

(b) Ferromagnetic material

(c) Diamagnetic material

(d) Anti ferromagnetic

4. Polarization is defined as the dipole moment per unit

(a) Length (b) Area

(c) Volume (d) Time

5. The madelung constant for the NaCl structure converges to a value ————

(a) 1.7475 (b) 1.7745

(c) 1.7557 (d) 1.7345

6. The coordination number of a NaCl crystal is

(a) 4 (b) 6

(c) 12 (d) 8

12. (a) Outline the classical theory of diamagnetism.

Or

(b) Explain Antiferromagnetism.

13. (a) Write the types of bonds in crystals. Describe ionic bond with a diagram.

Or

(b) Explain the cohesive energy of ionic solids.

14. (a) Define :

(i) Effect of magnetic field

(ii) Meissner effect

(iii) Isotope effect.

Or

(b) Write a note on type II superconductors.

15. (a) Write a note on synthesis of nanomaterials.

Or

(b) Describe Fullerence nanotubes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the seven classes of crystals.

Or

(b) Explain the Miller indices.

17. (a) Explain Weiss theory of paramagnetism.

Or

(b) Explain the electronic polarization.

18. (a) Explain ionic and covalent bonds.

Or

(b) Explain application to sodium chloride crystal.

19. (a) Outline general properties of superconductors.

Or

(b) Explain high temperature T_C superconductors.

20. (a) Outline the classification of nanomaterials. Explain sol gel technique.

Or

(b) Explain carbon nanotubes.

———————

(6 pages) Reg. No. : _____

Code No. : 20049 E Sub. Code : SNPH 4 A/ ANPH 41

U.G. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Fourth Semester

Physics – Non Major Elective

BASIC PHYSICS – II

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer.

1. The order of magnitude of the B.E per nucleon in a nucleus is

(a) 10^{-1} Mev

(b) 10 Mev

(c) 10^{-2} Mev

(d) 0.1 Mev

2. A nuclear fission reaction becoming self-sustaining depends on

(a) Electron (b) Neutron

(c) Energy (d) Proton

3. Material that takes permanent magnetic dipoles is known as _____

(a) Paramagnetic (b) Diamagnetic

(c) Ferromagnetic (d) Ferrimagnetic

4. The relative Permeability of the super conducting material is

(a) 0 (b) 1

(c) -1 (d) ∞

5. The unique property of laser is

(a) Directional (b) Speed

(c) Coherence (d) Wavelength

6. _____ laser is an example of Optical pumping.

(a) Ruby (b) He-Ne

(c) Semi Conductor (d) Dye

7. In Special theory of relativity frame of reference is _____

(a) Inertial (b) Non - inertial

(c) Non - accelerated (d) Accelerated

8. The concept of matter wave was suggested by

(a) Heisenberg (b) De Broglie

(c) Schrodinger (d) Laplace.

9. The octal equivalent of the decimal number $(417)_{10}$ is

(a) $(641)_8$ (b) $(619)_8$

(c) $(640)_8$ (d) $(598)_8$

10. The hexadecimal equivalent of $(654)_8$ is

(a) BAC (b) 12A

(c) 1AC (d) B1C

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Give an account on binding energy of a nucleus?

Or

(b) Compare Nuclear fission and fusion.

12. (a) Describe the properties of diamagnetic materials.

Or

(b) List out the applications of superconductors.

13. (a) Describe about spontaneous emission.

Or

(b) Describe the working of CO_2 laser.

14. (a) Discuss the postulates of special theory of relativity.

Or

(b) Summarize the postulates of Quantum Mechanics.

15. (a) Convert the decimal number 244 and 145into a binary number

Or

(b) Solve : (i) $10001_2+11101_2$ (ii) $10111_2+110001_2$

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the liquid — drop model of the nucleus. What are its merits and demerits?

Or

(b) Explain radioactivity and its types.

17. (a) Discuss about amorphous and crystalline materials.

Or

(b) Enumerate the important properties of superconductors.

18. (a) Explain about population inversion of photons in laser.

Or

(b) Describe the working of a He - Ne with a neat diagram.

19. (a) Explain length contraction and time dilation.

Or

(b) Define de Broglie wavelength? What is the de Broglie wavelength of an electron of mass 9.11×10^{-31} kg moves at the speed of 3×10^8m/s.

20. (a) (i) Convert the binary number 1010 into its equivalent hex, decimal and octal number.

(ii) What is BCD? Give an example.

Or

(b) Explain the digital logic gates with a neat diagram.

———————

Pages)

Reg. No. : .....

Code No. : 30322 E **Sub. Code : SSPH 4 A/ ASPH 41**

Sc. (CBCS) DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Physics

Skill Based Subject — MAINTENANCE OF ELECTRONIC APPLIANCES

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

If the last band in a resistor is gold, the tolerance is

(a) 20% (b) 15%

(c) 10% (d) 5%

The antenna is a conductor that radiates or intercepts ———— wave energy.

(a) electrochemical (b) electrical

(c) mechanical (d) electromagnetic

The heart of mobile communication system is

(a) base terminal station

(b) base station controller

(c) mobine switching center

(d) none of the above

The aperture of a camera lens controls the

(a) image sharpness

(b) depth of field of an image

(c) amount of light reaching the sensor

(d) all the above

Before images are transferred to the memory card, they are stored in the

(a) sensor

(b) buffer

(c) secondary memory card

(d) none of the above

2. The wires used in multimeters have ———— resistance.

(a) zero (b) small

(c) large (d) infinite

3. A CRO can be used to measure

(a) a.c. voltage (b) d.c. voltage

(c) frequency (d) all the above

4. The stored image in digital storage oscilloscope can be displayed

(a) for a limited time

(b) for infinite time

(c) for zero time

(d) for an intermediate time

5. Thermistor is a ———— transducer.

(a) resistive (b) inductive

(c) capacitive (d) all the above

6. Transducers convert

(a) electrical signal into non electrical quantity

(b) non-electrical quantity into electrical signal

(c) electrical signal into mechanical quantity

(d) all the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain colour coding of resistors with examples.

Or

(b) Describe the method of achieving good soldering.

12. (a) Give the difference between analog and digital multimeters.

Or

(b) Describe how to detect a faulty capacitor.

13. (a) Give the basic requirements of a transducer.

Or

(b) Explain the working of a light transducer.

14. (a) Explain the basic concepts of radio transmitter.

Or

(b) Describe the cellular structure of a mobile communication system.

15. (a) Give the difference between wide angle lens and telephoto lens.

Or

(b) Write about digital data transfer from a digital camera to computed.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the various types of resistors.

Or

(b) Calculate the equivalent resistance while converting star connection into delta connection and delta in connection into star connection.

17. (a) Draw the block diagram of CRO and explain the function of each unit in it.

Or

(b) Describe the construction and working of LCD displays of instruments.

18. (a) Describe the classification of transducers.

Or

(b) Explain the construction and working of a resistance temperature detector.

19. (a) Describe the construction and working of the yagi antenna.

Or

(b) Discuss the requirements and working of the telephone system.

20. (a) Explain the essential accessories of a camera.

Or

(b) Explain ISO speed and resolution of a digital camera.

———————

(6 pages)

Reg. No. : .....

Code No. : 10314 E **Sub. Code : AEPH 52**

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2023.

Fifth Semester

Physics

Major Elective – COMMUNICATION ELECTRONICS

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks).

Answer ALL questions.

Choose the correct answer :

1. A modulation index of 0.5 would be same as _____.

   (a) 0.5 of modulation depth

   (b) 1/2% of modulation depth

   (c) 5% of modulation depth

   (d) 50% of modulation depth

2. How can the noise be reduced in AM signal?

   (a) increasing amplitude

   (b) increasing wavelength

   (c) increasing bandwidth

   (d) increasing frequency deviation

3. Super heterodyne receivers _____.

   (a) have high selectivity

   (b) have better sensitivity

   (c) need extra circuitry for frequency conversion

   (d) all the above

4. Identify the type of modulation where the frequency of the modulated wave is equal to that of the carrier wave

   (a) frequency modulation

   (b) amplitude modulation

   (c) carrier modulation

   (d) phase modulation

5. Input signal in phase modulation changes according to _____ of a carrier wave.

   (a) amplitude (b) phase

   (c) frequency (d) time

6. Advantage of using direct method for generation of FM signal is _____.

(a) It gives high stability to FM signal frequency

(b) Distortion free FM signal is generated

(c) High power FM generation is possible

(d) None

7. What is the reason for using pre-emphasis?

(a) increase amplitude

(b) reduce carrier shift

(c) amplify RF signal

(d) reduce noise reception

8. Amplitude limiter in FM receivers are used to remove _____ variation due to noise.

(a) frequency (b) amplitude

(c) phase (d) none

9. BPSK signal can be demodulated by using

(a) high pass filters

(b) band pass filters

(c) loss pass filters

(d) none

10. In duobinary signaling method, for m-ary transmission, the number of output obtained is _____.

(a) 2 M (b) 2 M+1

(c) 2 M–1 (d) M2

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the three degrees of modulation in AM wave.

Or

(b) Describe a collected modulator.

12. (a) Compare the various AM systems.

Or

(b) Explain the parameters of radio receiver set.

13. (a) Define phase modulation. Derive an expression for instantaneous voltage and modulation index of phase modulation.

Or

(b) Explain commercial broadcast FM.

14. (a) Explain the operation of Foster-Seely discriminator. Discuss its frequency response curve.

Or

(b) Define FM threshold. Explain a threshold FM demodulator with negative feedback.

15. (a) Explain binary phase shift keying.

Or

(b) Compare the performance of different digital modulation schemes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the frequency spectrum and bandwidth of AM wave.

Or

(b) Describe single side band suppressed carrier AM. Explain the phase shift method of generating it.

17. (a) Describe the various parts of AM receiver using a block diagram.

Or

(b) Describe the principle and working of double frequency conversion AM receiver.

18. (a) Explain with the help of vector diagrams, the phasor representation of FM and PM.

Or

(b) Describe the indirect method of FM generation.

19. (a) Explain a FM super heterodyne receiver.

Or

(b) Draw and explain the operation of ratio detector.

20. (a) Explain Quadrature phase shift keying.

Or

(b) Describe M-ary FSK system. Write its specific advantage and disadvantage.

———————

(6 pages) **Reg. No. :**.....

Code No. : 10315 E **Sub. Code : AEPH 61**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Sixth Semester

Physics — Major Elective

ENERGY PHYSICS

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer

1. World Energy Needs are rising due to
   (a) deforestation
   (b) increasing population and Industrialization
   (c) inflation
   (d) natural calamities

2. Which among the following causes environmental pollution?
   (a) Biomass (b) Solar energy
   (c) Coal (d) Wind

3. In what form is solar energy is radiated from the sun?
   (a) Ultraviolet Radiation
   (b) Infrared radiation
   (c) Electromagnetic waves
   (d) Transverse waves

4. The scattered solar radiation is called _____
   (a) Direct Radiation (b) Beam Radiation
   (c) Diffuse radiation (d) Infrared Radiation

5. A solar cell is a _____
   (a) P-type semiconductor
   (b) N-type semiconductor
   (c) Intrinsic semiconductor
   (d) P-N Junction

6. The electrical characteristics of a solar cell
   (a) Voltage (b) Resistance
   (c) Current (d) All the above

The component of biogas is ————————

(a) Uranium (b) Thorium

(c) Methane (d) Hydrochloric acid

Biomass is used in the production of

(a) fibres

(b) chemicals

(c) transportation fuels

(d) biochemicals

Wind turbines convert wind energy to ————————

(a) mechanical energy

(b) electrical energy

(c) heat energy

(d) solar energy

A fuel cell is used to convert chemical energy into ————————

(a) Mechanical energy (b) Solar energy

(c) Thermal energy (d) Potential energy

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain various forms of Energy.

Or

(b) Outline applications of Coal.

12. (a) Write short materials for flat plate collector.

Or

(b) Write Short note on solar cooker.

13. (a) Write Short note Basic Solar Cell.

Or

(b) Outline Theory of PV Powered Fan System.

14. (a) Describe working of Biogas Plant.

Or

(b) Write Advantages and disadvantages of Biological Conversion of Solar Energy.

15. (a) Write short note Wind Energy Collector.

Or

(b) Describe Working and Application of Fuel Cell.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain non conventional energy sources and environment.

Or

(b) Compare Coal Oil and Natural Gas.

17. (a) With relevant Theory, Explain the Working of Flat Plate Collector.

Or

(b) Outline Merits and Demerits of Solar Energy.

18. (a) Explain Basic Photo Voltaic System for Power Generation.

Or

(b) Outline Advantages and Disadvantage of Solar Photo voltaic System.

19. (a) What is biomass conversion? Discuss its Advantages and Disadvantages as energy source.

Or

(b) Explain the working of a downdraft gasifier with a neat diagram.

20. (a) Define Ocean thermal energy conversion. Explain principles of Ocean thermal energy conversion.

Or

(b) Outline advantages and limitations of Tidal Power Generation.

———————

(6 pages) Reg. No. : _____

Code No. : 10304 E **Sub. Code : AMPH 51**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Fifth Semester

Physics — Core

BASIC ELECTRONICS

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Give condition justifies which network theorems : The load impedance should be complex conjugate of the internal impedance of the active network
   (a) Compensation theorem
   (b) Millman's theorem
   (c) Maximum power transfer theorem
   (d) Reciprocity theorem

2. What do you mean by h parameters?
   (a) Hyper parameters
   (b) Hybrid parameters
   (c) Linear parameters
   (d) All of the above

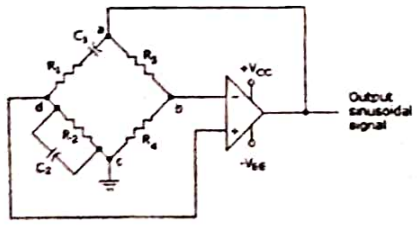
3. Zener diodes are also known as
   (a) Voltage regulators
   (b) Forward bias diode
   (c) Breakdown diode
   (d) None of the mentioned

4. In a full wave rectifier, the current in each diode flows for
   (a) Whole cycle of the input signal
   (b) Half cycle of the input signal
   (c) More than half cycle of the input signal
   (d) None of these

5. When the base region is common to both input and output circuits, the configuration is called ———?
   (a) Common Emitter
   (b) Common base
   (c) Common collector
   (d) Open circuit

6. The current ratio of a beta is ———?
   (a) IC/IE (b) IB/IC
   (c) IE/IB (d) IC/IB

7. Calculate the value of $C_1 = C_2$ for the Wien bridge oscillator to operate at a frequency of 20 kHz. Assume $R_1 = R_2 = 50\,k\Omega$ and $R_3 = 3R_4 = 600\,\Omega$?



   (a) 1.59 pF (b) 15.9 pF
   (c) 159 pF (d) 1.59 nF

8. A multivibrator is an electronic circuit used to implement ———
   (a) Oscillator (b) Timer
   (c) Flip-flop (d) All of the above

9. Operational amplifier has ——— outputs.
   (a) single (b) similar
   (c) multiple (d) differential

10. Operational amplifier output is represented as ———
    (a) Vin (b) Vout
    (c) V+ (d) V–

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) State and explain Norton's theorem.

    Or

    (b) Describe about the maximum power transfer theorem.

12. (a) Explain V-I characteristics of Zener diode.

    Or

    (b) Distinguish half wave rectifier and full wave rectifier.

13. (a) Analyze the common base amplifier using h-parameter.

    Or

    (b) Explain push pull amplifier.

14. (a) Explain the Hartley Oscillator and derive the equation for oscillator.

Or

(b) Write an essay on differentiating circuits.

15. (a) List out the characteristics of ideal operational amplifier.

Or

(b) Write a short note on non-inverting amplifier.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Write an essay on Thevenins theorem.

Or

(b) Determine the h-parameters for equivalent circuit of a transistor.

17. (a) Describe about the full wave bridge rectifier.

Or

(b) Explain the working principle of tunnel diode.

18. (a) Summarize the working action of a transistor.

Or

(b) Write an essay on transformer coupled amplifier.

19. (a) Explain phase shift oscillator using transistor.

Or

(b) Give an account on astable multivibrator.

20. (a) Explain integrator.

Or

(b) Compare low pass and high pass filter.

———————

(6 pages) **Reg. No. :** .....

Code No. : 10305 E **Sub. Code : AMPH 52**

B.Sc (CBCS) DEGREE EXAMINATION, APRIL 2023.

Fifth Semester

Physics – Core

SPECTROSCOPY

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which among the following is symmetric top molecule

(a) CH_3F

(b) HCI

(c) OCS

(d) C_2H_2I

2. The molecule which have all three principal moment of inertia different are called

(a) Assymmetric top molecules

(b) Spherical top molecules

(c) Linear molecule

(d) Symmetric top molecule

3. Mid–IR region mainly consists of

(a) 4000 – 100 cm^{-1}

(b) 14000 – 4000 cm^{-1}

(c) 4000 – 400 cm^{-1}

(d) 400 – 100 cm^{-1}

4. Overtones are mainly observed in

(a) Near IR (b) Mid IR

(c) Far IR (d) Not in IR region

5. In Raman spectroscopy the radiation lies in the _____

(a) Microwave region (b) Visible region

(c) UV region (d) X–ray region

6. For a compound to be Raman active it should show

(a) Dipole moment

(b) Polarizability

(c) Induced dipole moment

(d) Unsaturation

7. The possible transitions for water molecule in UV visible region are

(a) $\sigma - \sigma^*$ (b) $n \rightarrow n^*$, $n \rightarrow n^*$

(c) $\sigma - \sigma^*$, $n \rightarrow n^*$ (d) $n \rightarrow \sigma^*$

8. The unit of absorbance is

(a) cm (b) L mol^{-1} cm^{-1}

(c) Lg m^{-1} cm^{-1} (d) no unit

9. The nuclei that doesn't give NMR signal is

(a) 15N (b) 11B

(c) 19F (d) 31P

10. The chemical shift (δ) in NMR spectrum has

(a) Dimensional (b) Dimensionless

(c) No unit (d) Unit

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain the theory of microwave spectroscopy.

Or

(b) Define:

(i) Rotational constant

(ii) Selection rule for rational spectra.

12. (a) Outline the theory of IR spectroscopy.

Or

(b) Explain analysis by IR techniques.

13. (a) Explain the quantum theory of Raman effect.

Or

(b) Describe Raman spectra of symmetric top molecules.

14. (a) Explain transmittance and absorbance of UV spectroscopy.

Or

(b) Discuss briefly types of transitions in UV.

15. (a) Write the application of NMR spectroscopy.

Or

(b) Define chemical shift in NMR. Write the rules for spin spin splitting.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Obtain the transition frequency in terms of B and J for a symmetric top molecule.

Or

(b) Explain the diatomic molecules as a non rigid rotator.

17. (a) Explain diatomic vibrating rotator in IR.

Or

(b) Explain the theory of molecular vibrations.

18. (a) Explain the cause of Raman effect. Give its importance.

Or

(b) Explain structure determination from IR and Raman spectroscopy.

19. (a) Explain the absorption laws in UV spectroscopy. Write the limitation of Beer Lambert law.

Or

(b) Explain how does a UV spectrophotometer work.

20. (a) Explain origin of NMR signal.

Or

(b) Discuss briefly magnetic resonance imaging.

———————

(6 Pages) Reg. No. : .....

Code No. : 10306 E **Sub. Code : AMPH 53**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Fifth Semester

Physics — Core

ATOMIC AND NUCLEAR PHYSICS

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Band gap energy of germanium is
   (a) 0.2 eV
   (b) 0.67 eV
   (c) 6 eV
   (d) 1.2 eV

2. Positive rays have ———
   (a) low penetrating power
   (b) high ionising power
   (c) low ionising power and high penetrating power
   (d) both (a) and (b)

3. The shell corresponds to n = 4 is
   (a) K (b) L
   (c) M (d) N

4. Normal Zeeman effect takes place in
   (a) weak magnetic field
   (b) strong magnetic field
   (c) weak electric field
   (d) strong electric field

5. Wavelength of Soft X-rays is of the order of
   (a) 10 Å (b) 100 Å
   (c) 2 Å (d) 20 Å

6. Charged particles are trapped to form Van Allen belt due to ——— field of earth.
   (a) magnetic (b) electric
   (c) gravitational (d) electromagnetic

7. One a.m.u. is equal to
   (a) 931 MeV (b) 931 eV
   (c) 931 KeV (d) 931 meV

8. During beta decay ——— remains constant.
   (a) Z (b) A
   (c) N (d) M

9. Hydrogen bomb works on the principle of
   (a) nuclear fusion (b) nuclear fission
   (c) alpha decay (d) beta decay

10. Proton is made up of
    (a) one quark (b) two quarks
    (c) three quarks (d) four quarks

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Give the principle of Hall effect.

Or

(b) Give the construction of Aston's mass spectrograph.

12. (a) Describe j-j coupling.

Or

(b) Explain the postulates of vector model of atom.

13. (a) What are called X-rays? List its properties.

Or

(b) What are cosmic ray showers? How are they produced?

14. (a) Obtain an expression for half-life a radioactive element.

Or

(b) Write down the properties of alpha rays.

15. (a) Explain the chain reaction.

Or

(b) Write notes on elementary particles.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) What is Hall effect? Obtain an expression for Hall coefficient of a metal and give its uses.

Or

(b) Explain the construction and working of Thomson's parabola method.

17. (a) Describe stern and Gerlach experiment with relevant theory. Discuss the importance of the results obtained.

Or

(b) What is Zeeman effect? Give the experiment and quantum mechanical explanation.

18. (a) Describe rotating crystal method to determine the cell dimensions of a crystal.

Or

(b) Analyse the effects of altitude and latitude on cosmic rays.

19. (a) Describe the liquid drop model of the nucleus.

Or

(b) Explain the construction and working of Betatron.

20. (a) Describe the construction and working of a nuclear reactor.

Or

(b) Explain the quark model.

———————

(6 pages) Reg. No. : .....

Code No. : 10307 E **Sub. Code : AMPH 61**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Sixth Semester

Physics – Core

QUANTUM MECHANICS

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Bohr model of atom is contradicted by _____.
   (a) Pauli's exclusion principle
   (b) Planck quantum theory
   (c) Heisenberg uncertainty principle
   (d) All of these

2. A black surface absorbs _____ as compared to a white surface, under identical conditions.
   (a) Same heat (b) Negligible heat
   (c) More heat (d) Lesser heat

3. Which of the following is the correct expression for the group velocity?
   (a) $v\lambda$ (b) $d\omega/dv$
   (c) dE/dk (d) $dE/\hbar dk$

4. The energy of the particle is proportiontial to
   (a) n (b) n^{-1}
   (c) n^2 (d) n^3

5. The uncertainty principle applies to
   (a) Macroscopic particles
   (b) Microscopic particles
   (c) Gases
   (d) None of the above

6. Uncertainty principle can be easily understood with the help of
   (a) Dalton's effect (b) Compton's effect
   (c) Electrons effect (d) Rhombic effect

7. A schrodinger equation is a _____ form of equation.
   (a) Linear
   (b) Partial differential
   (c) Non linear
   (d) None of the above

8. The ground state energy of an electron confined to a box 1 Å wide is
   (a) 6.016×10^{-20} (b) 2.016×10^{-18}
   (c) 5.02×10^{-18} (d) 6.016×10^{-18}

9. The oscillatory solution is physically
   (a) Acceptable
   (b) Divergent
   (c) Not acceptable
   (d) None of these

10. For a particle inside a box, the potential is maximum at X =
    (a) L (b) 2L
    (c) L/2 (d) 3L

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is meant by black body radiation? Describe the photo electric effect.

Or

(b) Explain in details about the Plank's quantum theory.

12. (a) Describe the De Broglie hypothesis for matter waves.

Or

(b) Write short notes on phase and group velocity.

13. (a) Explain the-elementary proof of Heisenberg's uncertainty relation.

Or

(b) Explain in elementary proof of the Heisenberg's uncertainty relation between energy and time.

14. (a) What are the physical interpretation of the wave function ψ ?

Or

(b) What are the postulates of quantum mechanics?

15. (a) Explain the particle in a one dimensional box.

Or

(b) What is Schrödinger wave equation for particle in a rectangular three dimensional box?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss about the Bohr's quantization of angular momentum and its application to the hydrogen atom.

Or

(b) Discuss about the failure of classical physics and to explain energy distribution in the spectrum of a black body.

17. (a) State and explain wave particle duality.

Or

(b) Explain the interference of electrons.

18. (a) Explain the illustration of Heisenberg's uncertainty principle by thought experiments.

Or

(b) State Uncertainty principle and describe the consequences of the uncertainty relation.

19. (a) Derive the expression for Schrödinger's one dimensional time-dependent wave equation.

Or

(b) Describe the Eigen value and Eigen value equation.

20. (a) Explain in detail about simple harmonic oscillator.

Or

(b) Explain in detail about Reflection at a sleep potential and the transmission across a potential barrier.

———————

(7 pages) Reg. No. : .....

Code No. : 10308 E **Sub. Code : AMPH 62**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Sixth Semester

Physics – Core

DIGITAL ELECTRONICS

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Binary coded decimal is a combination of _____.
   (a) Two binary digits
   (b) Three binary digits
   (c) Four binary digits
   (d) Five binary digits

2. The excess-3 code for 597 is given by _____.
   (a) 100011001010
   (b) 100010100111
   (c) 010110010111
   (d) 010110101101

3. According to boolean law: A + 1 = ?
   (a) 1 (b) A
   (c) 0 (d) A'

4. A _____ value is represented by a Boolean expression.
   (a) Positive (b) Recursive
   (c) Negative (d) Boolean

5. In S-R flip-flop, if Q = 0 the output is said to be _____.
   (a) Set (b) Reset
   (c) Previous state (d) Current state

6. When both inputs of a J-K flip-flop cycle, the output will _____.
   (a) Be invalid (b) Change
   (c) Not change (d) Toggle

7. K-map is used for _____.
   (a) logic minimization
   (b) expression maximization
   (c) summing of parity bits
   (d) logic gate creation

8. How many select lines are required for a 1-to-8 demultiplexer?
   (a) 2 (b) 3
   (c) 4 (d) 5

9. A decimal counter has _____ states.
   (a) 5 (b) 10
   (c) 15 (d) 20

10. BCD counter is also known as _____.
    (a) Parallel counter
    (b) Decade counter
    (c) Synchronous counter
    (d) VLSI counter

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Encode the following decimal number to BCD code
    (i) 46
    (ii) 327.89
    (iii) 20.305.

    Or

    (b) Find one's compliment of the following number
    (i) 10100111
    (ii) 0111.

12. (a) Discuss briefly positive and Negative logic systems.

    Or

    (b) Draw the circuit and working of EX-OR gate with truth table.

13. (a) Describe the working of R-S flip flop with diagram.

    Or

    (b) Describe the workingof T-flip flop with a diagram.

14. (a) Explain term

(i) AND OR realization

(ii) OR AND realization.

Or

(b) Briefly explain Multiplexer with diagram.

15. (a) Differentiate synchronous and Asynchronous Counter. Write a note Binary Counter.

Or

(b) Explain term

(i) Linearity and

(ii) Settling time of a D/A converter.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Determine the decimal number represented by binary number.

(i) 110101

(ii) 101101

(iii) 11111111.

Or

(b) ADD Binary numbers

(i) 1011+1101

(ii) 1010.1101 + 101.01

Perform the following subtraction

(i) 1011-0110

(ii) 1110-1001

17. (a) Write the basic logic gates. Describe the working of OR gate with truth table.

Or

(b) Explain function of NAND and NOR gates.

18. (a) Explain the operation of JK flipflop with a diagram.

Or

(b) Briefly Explain working of Monostable Multivibrator with a circuit diagram.

19. (a) Minimize the following boolean function

$F(A, B, C, D) = \Sigma m (0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$

Or

(b) Explain Encoder with a circuit diagram.

20. (a) Explain Parallel in serial out and Parallel in Parallel out shift registers.

Or

(b) Explain MOD-5 counter with diagram.

———————

Reg. No. : .....

Code No. : 10309 E **Sub. Code : AMPH 63**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Sixth Semester

Physics – Core

SOLID STATE PHYSICS

(For those who joined in July 2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Effective number of atoms belonging to the unit cell of simple cubic structure

(a) 8 (b) 1

(c) 4 (d) 6

2. The miller indices of the plane parallel to the X axis and Y axis are

(a) (100) (b) (010)

(c) (001) (d) (111)

3. The element which has covalently bonded crystal structure is

(a) aluminium (b) sodium chloride

(c) lead (d) germanium

4. The bond between the ice molecules is

(a) ionic bond (b) covalent bond

(c) metallic bond (d) hydrogen bond

5. Diamagnetic Susceptibility is

(a) large, negative (b) small, positive

(c) small, negative (d) large, positive

6. The transition from the ferromagnetic to the paramagnetic state is named after

(a) Curie (b) Curie- Weiss

(c) Neel (d) Debye

7. Below transition temperature a superconducting material exhibits

(a) only zero resistance

(b) only diamagnetic property

(c) zero resistance and diamagnetism

(d) zero resistance and ferromagnetism

8. Examples of Type-I Superconductors are

(a) Al, Nb and Ta (b) Al, Zn and Hg

(c) Ta, V and Nb (d) Al, Zn Ba

9. An example of zero dimensional nanostructure

(a) Nanoparticles (b) Nanorods

(c) Nanotubes (d) All of the above

10. Carbon nanotubes are the sheets of graphite about

(a) 0.1 nm (b) 0.2 nm

(c) 0.3 nm (d) 0.4 nm

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the Bravais lattices in a cubic crystals.

Or

(b) Describe the crystal structure of Diamond.

12. (a) Write a note on Hydrogen bonding.

Or

(b) Outline the comparison between ionic and covalent solids.

13. (a) Explain Domain theory of ferromagnetism.

Or

(b) Explain the electronic polarizability in atoms and obtain an expression for it.

14. (a) What is Meissner effect? Show that superconductors exhibit perfect diamagnetism.

Or

(b) Write a note on BCS theory of Superconductivity.

15. (a) Write a brief note on Sol gel technique.

Or

(b) Outline the Properties of Fullerene.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Draw and Explain the structure of Nacl.

Or

(b) Derive Bragg law of X ray diffraction.

17. (a) What are ionic crysatals? Explain the formation of ionic crystals. Obtain an expression for its cohesive energy.

Or

(b) What is Madelung constant? Evaluate its value for Nacl.

18. (a) Explain Weiss theory of paramagnetism.

Or

(b) Explain ionic and orientation polarization.

19. (a) Derive London equation.

Or

(b) Outline comparison of Type I and Type II Superconductor.

20. (a) Explain Ball milling method.

Or

(b) Outline the properties and applications of grapheme.

———————

(6 Pages) Reg. No. : .....

Code No. : 10310 E **Sub. Code : ASPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Third Semester

Physics

Skill Based Subject — MAINTENANCE OF ELECTRICAL APPLIANCES

(For those who joined in July 2020 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A capacitor does not allow ——— to pass through to it.

   (a) a.c. (b) d.c.

   (c) a.c. and d.c. (d) none

2. Ammeter provides path for ———

   (a) maximum voltage (b) minimum voltage

   (c) maximum current (d) minimum current

3. ——— transformer has multiple flux paths.

   (a) Core type (b) Shell type

   (c) Berry type (d) core and shell type

4. The emf equation of a transformer is ———

   (a) $4 f\phi_m$ (b) $1.11 f\phi_m$

   (c) $4.44 f\phi_m$ (d) $4.44 n_2 f\phi_m$

5. ——— type of washing machine contains two tubs.

   (a) Semi-automatic

   (b) Automatic

   (c) Automatic without timer

   (d) Automatic with timer

6. Domestic appliances are connected in parallel across a.c mains because

   (a) it is a simple arrangement

   (b) all appliances have same current ratings

   (c) operation of each appliance becomes independent of each other

   (d) none of the above

7. In an a.c circuit, the magnitude of the current can be reduced using a ———

(a) resistor (b) inductor

(c) capacitor (d) transformer

8. Delta connection is also known as ———

(a) Y-connection

(b) Mesh connection

(c) Either Y-connection or mesh connection

(d) Neither Y-connection or mesh connection

9. ——— is used as a protective element against overload.

(a) Resistor (b) Inductor

(c) Capacitor (d) Fuse

10. ——— is used to determine the direction of rotation of d.c. motor.

(a) Columb's law

(b) Lenz's law

(c) Fleming's left hand rule

(d) Fleming's right hand rule

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain how to test a diode and measure voltage with a digital multimeter.

Or

(b) Discuss the consumption of power in electrical appliances.

12. (a) Explain the sources of power loss in transformer.

Or

(b) Describe testing of transformers.

13. (a) Write in detail the various parts of a wet grinder.

Or

(b) Explain the working of a domestic air conditioner.

14. (a) Derive the expression for RMS value of current.

Or

(b) Explain the electrical wiring color code in India.

15. (a) Describe the principle and function of an electrical fuse.

Or

(b) Explain the various components in an UPS and their functions.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Describe the different types of capacitors.

Or

(b) Explain the conversion of a galvanometer into an ammeter.

17. (a) Explain the different methods of cooling of the transformers.

Or

(b) Describe the principle, construction and working of an auto transformer.

18. (a) Give the principle, construction and working of an electrical fan.

Or

(b) Explain the principle and working of storage and instant type water heaters.

19. (a) Give the purpose of doing earthing. Explain the different methods of earthing.

Or

(b) Describe single phase and three phase connection.

20. (a) Explain a circuit breaker with neat diagram and give its use

Or

(b) Describe the construction and working of a d.c. generator.

———————

(7 pages) **Reg. No. :** .....

Code No. : 10436 E **Sub. Code : CAPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

First/Third Semester

Physics — Allied

ALLIED PHYSICS — I

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A rod is placed between two fixed supports and it is heated. What type of stress is developed on a rod?
   (a) compressive stress
   (b) tensile stress
   (c) shear stress
   (d) relative stress

2. The steel is used to make the spring compared to aluminium because ———
   (a) Steel is cheaper than aluminium
   (b) Aluminium is more elastic than steel
   (c) Steel is more elastic than aluminium
   (d) None of these

3. Which type of fluids have zero surface tension?
   (a) real fluids
   (b) ideal fluids
   (c) both ideal and real fluids
   (d) no fluids

4. The viscosity of a fluid in motion is 1 poise. What will be it's viscosity (in poise) when the fluid is at rest
   (a) 0 (b) 0.5
   (c) 1 (d) 2

5. Periodic vibrations of decreasing amplitude are called ———
   (a) free vibrations
   (b) damped vibrations
   (c) forced vibration
   (d) none of these

6. For a body moving in simple harmonic motion, the number of cycles per second is known as its ———

(a) oscillation (b) amplitude

(c) period (d) frequency

7. Heat transfer in liquids and gases are due to ———

(a) conduction

(b) convection

(c) radiation

(d) conduction as well as convection

8. Most metals are good conductors of heat because of ———

(a) transport of energy

(b) free electrons and frequent collision

(c) lattice defects

(d) capacity to absorb energy

9. How shall a diffraction pattern change when white light is used instead of a monochromatic light?

(a) the pattern disappears

(b) the shape of the pattern will change

(c) coloured pattern will be observed

(d) the fringes change position

10. What happens if ordinary unpolarised light is passed through a uniaxial crystal?

(a) light split into two rays

(b) light remain unaffected

(c) light splits into more than two rays

(d) none of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive the relation between the three modulus of elasticity.

Or

(b) Describe an experiment to determine the Young's modulus of a bar by uniform bending.

12. (a) Define surface tension. Explain the molecular interpretation of surface tension.

Or

(b) Derive Stoke's formula by dimension method.

13. (a) Define simple harmonic motion. Derive the expression for time period of the particle in simple harmonic motion.

Or

(b) Describe Melde's string experiment to determine the frequency of an electrically maintained tuning fork in transverse mode.

14. (a) Define mean free path and obtain an expression for it.

Or

(b) Plot the energy distribution of a black body radiation for different temperatures. Also outline the important features of black body spectrum.

15. (a) Compare Fresnel and Fraunhofer diffraction.

Or

(b) Give the theory of Half wave plate.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Obtain an expression for the couple per unit twist. Also estimate the work done in twisting.

Or

(b) Explain a torsion pendulum and using it determine the rigidity modulus of a wire.

17. (a) Determine the expression for the rate of flow of liquid through a capillary tube.

Or

(b) Derive an expression for excess of pressure inside a synclastic and anticlastic surface.

18. (a) Is free vibration exist in practise. Give reasons Derive the expression for damped vibration.

Or

(b) Calculate the resultant of two simple harmonic motions acting in perpendicular direction.

19. (a) Describe Lee's disc experiment to determine the thermal conductivity of a poor conductor.

Or

(b) State and prove Wiedmann Franz law.

20. (a) Determine the thickness of a thin wire by air wedge method.

Or

(b) (i) Define interference and double refraction.

(ii) An wedge shaped film of $\mu = 1.4$ is formed between two glass plates separated at one edge by a very fine wire. when the wedge is illuminated from above by 600 nm light and if the fringe width is 2 mm, calculate the angle of the wedge.

(6 pages)

Reg. No. : .....

Code No. : 10437 E **Sub. Code : CAPH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Second/Fourth Semester

Physics — Allied

ALLIED PHYSICS — II

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. If two resistors of values 20 ohm and 30 ohm are connected in series then their equivalent resistance is

   (a) 50 ohm

   (b) 1/50 ohm

   (c) -50 ohm

   (d) 0

2. The instrument used to measure potential difference between two points is

   (a) Ammeter (b) Voltmeter

   (c) Rheostat (d) Transformer

3. The force on the wire is at right angles to both the direction on the magnetic field and the direction of the current. This is discovered by

   (a) Faraday (b) Ampere

   (c) Fleming (d) Johns Burge

4. The change in number of magnetic field lines induces

   (a) current in coil

   (b) electromotive force (EMF) in the coil

   (c) frequency in coil

   (d) all of the above

5. In the breakdown region, a zener diode behaves like a ——— source.

   (a) constant voltage

   (b) constant current

   (c) constant resistance

   (d) none of the above

6. Which gate is used to made IC decoders?

(a) NAND (b) NOR

(c) AND (d) None of the above

7. Nucleus is

(a) Positively charged

(b) Negatively charged

(c) Neutral

(d) Charge keeps on changing

8. Neutrons has the charge

(a) 1639 times of an electron

(b) 1739 times of an electron

(c) 1839 times of an electron

(d) 1939 times of an electron

9. What is the momentum of a body of 2 kg at its highest point, when thrown with a velocity of 15 m/s at an angle of 70° with the horizontal?

(a) 9.23 kg ms^{-1}

(b) 10.26 kg ms^{-1}

(c) 28.19 kg ms^{-1}

(d) None of the above

10. According to special theory of relativity which one is not an absolute quantity?

(a) time

(b) mass

(c) height

(d) both (a) and (b)

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Define Ohm's law and explain it.

Or

(b) Write a short note on sensitivity of Wheatstone bridge.

12. (a) State and explain the Faraday's law of electromagnetic induction.

Or

(b) Give the properties of diamagnetic materials.

13. (a) What is zener diode? Explain the I-V characteristics of it.

Or

(b) Find 2's complement of binary number 10101110_2.

14. (a) Write a note on Radioactivity.

Or

(b) Explain the properties of nuclear forces.

15. (a) Explain about the time of flight.

Or

(b) Write a note on length contraction.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Derive an expression for current density.

Or

(b) Describe abbut the conversion of galvanometer into an ammeter.

17. (a) Distinguish para and ferromagnetic materials.

Or

(b) Derive an expression for the mutual inductance of a coil using Ballistic Galvanometer.

18. (a) Describe the forward and reverse characteristics of junction diode.

Or

(b) What are the basis logic gates? Explain.

19. (a) Describe about the nuclear spin and nuclear magnetic dipole moment.

Or

(b) Explain the binding energy curve for nuclear.

20. (a) Describe about the greatest height attained by the projectiles.

Or

(b) Write down the Galiean transformation equation.

———————

(6 pages)

Reg. No. : .....

Code No. : 10432 E **Sub. Code : CMPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

First Semester

Physics — Core

PROPERTIES OF MATTERS AND MECHANICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Stress = ————

(a) Force/Volume (b) Force/Area

(c) Volume/Force (d) Area/Force

2. The unit for elastic modulus is ————

(a) N/m (b) Nm

(c) N/m^2 (d) Nm^2

3. The layer of a beam which is neither elongated nor contracted is known as ————

(a) neutral layer (b) bending layer

(c) bending axis (d) none of the above

4. In a beam

(a) length is very large compared to its breadth and thickness

(b) length is same as thickness

(c) length is less than thickness

(d) none of the above

5. The dimension of surface tension is

(a) MLT^{-2} (b) MLT^{-3}

(c) MT^{-2} (d) ML^2T^{-2}

6. If the pressure head is large, the resultant motion of the liquid in a narrow tube is

(a) stream lined motion

(b) turbulent motion

(c) steady motion

(d) none of the above

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7. The motion of a wheel is an example of ——— motion.

(a) translational (b) rotational

(c) elliptical (d) none of the above

8. An unbalanced torque is the cause of ———

(a) Vibrational motion

(b) Translational motion

(c) Rotational motion

(d) None of the above

9. The pressure of an ideal fluid is ——— in all directions when the fluid is in motion.

(a) different

(b) same

(c) sometimes same sometimes different

(d) none of the above

10. Bouyancy is ——— force.

(a) an upward (b) a downward

(c) a neutral (d) none of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain stress-strain diagram.

Or

(b) Find an expression for the work done in streching a wire.

12. (a) Derive an expression for the internal bending moment of a bar.

Or

(b) Determine the Young's modulus of the material of a bar by uniform bending.

13. (a) Explain the variation of surface tension with viscosity using Jaegar's method.

Or

(b) Describe Quincke's method of determining surface tension and angle of contact of mercury with glass.

14. (a) Give the period of oscillation of a compound pendulum.

Or

(b) Prove that rotational kinetic energy, $T = 1/2Iw^2$.

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15. (a) Calculate the thrust on a plane surface immersed in a liquid at rest.

Or

(b) Give the difference between streamlined and turbulent motion.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Describe with necessary theory, how to determine the rigidity modulus of a wire experimentally using torsion pendulum.

Or

(b) Determine the rigidity modulus of the material for a rod by static torsion method.

17. (a) Derive an expression for the depression at the loaded end of a cantilever.

Or

(b) Explain with theory, the experiment to determine the Young's modulus of the material of a bar by non-uniform bending.

18. (a) Obtain an expression for the excess of pressure in a synclastic and anticlastic surface.

Or

(b) Derive Poiseuille's formula for the rate of flow of the liquid in a capillary tube.

19. (a) Obtain an expression for moment of inertia and radius of gyration of a rotating rigid body.

Or

(b) Derive an expression for acceleration of a uniform body rolling down an inclined plane.

20. (a) Define metacentric height. Explain how metacentric height of a ship could be determined.

Or

(b) Explain how Bernoulli's theorem is applicable to Pitot's tube for measurement of velocity of fluid flow in a horizontal pipe.

———————

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(6 pages)

Reg. No. : .....

Code No. : 10434 E **Sub. Code : CMPH 31**

B Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Third Semester

Physics — Core

ELECTRICITY AND ELECTROMAGNETISM

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Electric field E = ———

(a) Fq^2 (b) F/q

(c) qF (d) q/E

2. The Thomson coefficient (σ) is ———

(a) constant (b) do not vary

(c) not a constant (d) none

3. Example for good conductor is

(a) plastic (b) ebonite

(c) wood (d) copper

4. Capacitance of a capacitor C = ———

(a) V/Q (b) Q/V

(c) V^2Q (d) VQ

5. Magnetic permeability μ = ———

(a) BH (b) H/B

(c) B/H (d) BH^2

6. Unit for magnetisation (M) is

(a) Am (b) Am^{-3}

(c) Am^{-1} (d) Am^{-2}

7. The law of electromagnetic induction was given by

(a) Faraday (b) Henry

(c) Fleming (d) Neumann

8. The coefficient of coupling between two coils of self inductance L_1 and L_2

(a) $\sqrt{\frac{L_1}{L_2}}$ (b) $\sqrt{L_1L_2}$

(c) $\sqrt{\frac{L_2}{L_1}}$ (d) $\frac{M}{\sqrt{L_1L_2}}$

9. The poynting vector P is

(a) P = E × H (b) P = B × H

(c) EH (d) BH

10. According to wave equation for electric field $\overline{E}$

(a) $\nabla.\overline{E} = \mu_0\varepsilon_0\left(\frac{\partial^2 E}{\partial t^2}\right)$

(b) $\nabla\times\overline{E} = \mu_0\varepsilon_0\left(\frac{\partial^2 E}{\partial t^2}\right)$

(c) $\nabla^2 E = \mu_0\varepsilon_0\left(\frac{\partial^2 E}{\partial t^2}\right)$

(d) $\nabla.\overline{E} = \frac{1}{\mu_0\varepsilon_0}\left(\frac{\partial^2 E}{\partial t^2}\right)$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain Seeback effect.

Or

(b) Explain Peltier effect.

12. (a) Derive an expression for the decay of current in L – R circuit.

Or

(b) How will you determine high resistance by leakage?

13. (a) Define the following :

(i) Magnetic induction

(ii) Magnetic susceptibility.

Or

(b) Establish the relation $B = \mu_0(H + M)$.

14. (a) State and explain the laws of electromagnetic induction.

Or

(b) State the faraday's law of electromagnetic induction. Deduce the faraday's law electromagnetic induction in the form $curl\ E = \frac{-\partial B}{\partial T}$.

15. (a) Explain transverse nature of electromagnetic radiation.

Or

(b) Write the Maxwell's equation in material medium.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Using Gauss law, find the electric field intensity due to a line of charge.

Or

(b) Describe Kohlraush bridge experiment to determine the specific conductivity of a electrolyte.

17. (a) Derive an expression for the growth of charge in LCR circuit.

Or

(b) Obtain an expression for the growth and decay of charge in a capacitor through a resistance.

18. (a) Give the theory, construction and working of a B.G.

Or

(b) Draw Desauty's bridge and explain how is it used to compare the two capacitances of two capacitors.

19. (a) Explain mutual inductance and state its units.

Or

(b) Draw Owen's bridge circuit and state the condition for balance.

20. (a) Obtain Marwell's equations and explain their significance.

Or

(b) Explain the Hertz experiment for the production and detection of EM waves.

———————

(6 pages)

Reg. No. : .....

Code No. : 10435 E **Sub. Code : CMPH 41**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Physics – Core

HEAT AND THERMODYNAMICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The basic principle of the joule Thomson effect is based on the transfer of heat _____.

(a) Heat (b) Temperature

(c) Volume (d) Entropy

2. The lowest pressure lambda point at 2.172 K is _____.

(a) 0.0497 atm (b) 0.003 atm

(c) 0.0457 atm (d) 0.0476 atm

3. What is the relation between kinetic energy (E) of a gas and its pressure (P) _____

(a) P = 2/3 E (b) P = 3 E

(c) P = 1/3 E (d) E = 2/3 P

4. Vander waals equation help us accurately define the physical state of a real _____.

(a) Gas (b) Solid

(c) Liquid (d) Semi solid

5. Thermal conductivity of material is a measure of its ability to conduct

(a) Heat (b) Volume

(c) Temperature (d) Entropy

6. A black body is an idealized physical body that _____ absorbs all incident electromagnetic radiation.

(a) absorbs (b) emit

(c) reflect (d) conduct

7. First law of thermodynamics also known as the law of conservation of _____.

(a) energy (b) momentum

(c) mass (d) density

8. Carnot cycle has _____ efficiency in all cycle.

(a) Maximum

(b) Minimum

(c) Both minimum and maximum

(d) None

9. The third law of thermodynamics states that the entropy of pure crystal at absolute zero is _____.

(a) zero (b) low

(c) high (d) medium

10. The behavior of carnot engine best understand by using _____ diagram.

(a) TS (b) VS

(c) HT (d) V-I

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) State and explain Joules Kelvin effect.

Or

(b) To write any five applications of low temperature.

12. (a) Explain about kinetic theory of gas.

Or

(b) State and determine Wonder walls constant.

13. (a) State and explain thermal conductivity.

Or

(b) To Describe about black body radiation.

14. (a) State and explain zeroth law of thermodynamics.

Or

(b) What are the difference between otto engine and diesel engine?

15. (a) How to draw the temperature entropy diagram?

Or

(b) State and explain third law of thermodynamics.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What is the difference between liquefaction hydrogen and helium gas?

Or

(b) Describe the process of production low temperature.

17. (a) Briefly explain maxwells law of distribution of molecular velocities.

Or

(b) To write relation between the wander walls constant critical constant.

18. (a) To give the detail explanation about thermal conductivity of good conductor.

Or

(b) Explain construction and working of Lee's disc method with suitable diagram.

19. (a) Explain work done during the adiabatic and isothermal process.

Or

(b) Explain construction and working of carnot engine with suitable diagram.

20. (a) What are the effect of pressure on melting and boiling point?

Or

(b) To derive the expression of maxwells thermodynamics relation and its application.

———————

(6 pages) Reg. No. : .....

Code No. : 10443 E **Sub. Code : CNPII 32**

U.G (CBCS) DEGREE EXAMINATION, APRIL 2023.

Third Semester

Physics

Non Major Elective – APPLIED PHYSICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following is an example for primary energy source.
   (a) solar energy
   (b) wind energy
   (c) coal energy
   (d) None

2. The natural resource among the following which is a renewable resource is
   (a) fossil fuel
   (b) metallic minerals
   (c) non-metallic minerals
   (d) forests

3. Fossil fuel is also known as
   (a) lubricating fuel (b) liquid fuel
   (c) solid fuel (d) mineral fuel

4. The percentage of global fossil fuel reserves are found in India is
   (a) 20% (b) 17%
   (c) 6.85% (d) 4%

5. Biomass is a _____ energy source.
   (a) renewable (b) non renewable
   (c) thermal (d) none

6. Biogas mixture contain _____% of methane.
   (a) 30 to 40 (b) 55 to 65
   (c) 90 to 95 (d) 80 to 85

7. Which of the following is not a green house _____?
   (a) CO_2 (b) CH_4
   (c) CFC (d) H_2

8. Solar cooker's are
   (a) used to heat water
   (b) used to heat air
   (c) used to cool water
   (d) used to cool air

9. Geothermal energy means
   (a) Heat energy received from earth
   (b) Heat energy received from solar
   (c) Heat energy received from ocean
   (d) Heat energy received from gobar

10. "Earth day" is celebrated on
    (a) 1st December
    (b) 5th June
    (c) 22nd April
    (d) 1st January

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Describe about conventional energy source.

    Or

    (b) Write down the advantages of renewable energy source.

12. (a) Describe the types of power in fossil fuels?

    Or

    (b) Write briefly statistical details in fossil fuels.

13. (a) Write a short note on biomass energy.

    Or

    (b) Write any five advantages and disadvantages of biomass energy.

14. (a) Describe the main applications of a solar pond?

    Or

    (b) Write the principle for a solar cell?

15. (a) State the principle of wing energy conversion.

    Or

    (b) Write a note on tidal energy conversion.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Describe about the various forms of energy and their availability.

Or

(b) Write an essay about renewable and conventional energy sources.

17. (a) Discuss about the various availability of energy resources.

Or

(b) Write briefly application of fossil fuels.

18. (a) Write an essay about the generation of biomass energy.

Or

(b) Explain about Deena Bandhu model gas plant.

19. (a) Write briefly notes for applications of solar energy.

Or

(b) Explain in merits and limitations for a solar cooker.

20. (a) Write an essay about geo thermal energy.

Or

(b) Describe the principle and working of OTEC system.

———————

Reg. No. : .....

Code No. : 10445 E **Sub. Code : CNPH 42**

U.G. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Physics

Non Major Elective – SPACE PHYSICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Motion of the earth on its axis in about 24 hours is called

(a) revolution (b) rotation

(c) both (a) and (b) (d) none of these

2. What is the name of the magnetic radiation belt that envelopes the earth in the shape of a doughnut?

(a) Aurora Borealis (b) Kuiper Belt

(c) Van Allen Belt (d) Asteroid Strip

3. Major asteroid impacts on the planets

(a) Have never occurred in our Solar System

(b) Take place only on Jupiter and Saturn

(c) Were once common place in the Solar System

(d) Produce new comets

4. A large body in space made of rock, ice, and frozen gas

(a) Meteoroid (b) Asteroid

(c) Comet (d) Moon

5. Which of the following planet has largest number natural satellite?

(a) Jupiter (b) Saturn

(c) Uranus (d) Neptune

6. The moon moves around the earth how many days

(a) 27 days (b) 30 days

(c) 21 days (d) 14 days

7. Which star is nearest to the earth?

(a) sun (b) orion

(c) pole star (d) moon

8. More than two-thirds of all observed galaxies are _____.

(a) Barred spiral (b) Irregular

(c) Spiral galaxies (d) Elliptical

9. Which one of the following theories explains the origin of the Universes?

(a) Tidal (b) Nebula

(c) Big Bang (d) Planetes

10. The universe alternately contracts and expands. This is according to

(a) heliocentric theory

(b) big bang theory

(c) steady state theory

(d) pulsating theory

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain about the different layers of earth.

Or

(b) Justify the importance of rotation of earth.

12. (a) Illustrate the characteristics of comets.

Or

(b) List out the uses of meteors.

13. (a) Annotate the structure of sunspot.

Or

(b) Comment on solar plages.

14. (a) Explain the different types of binary star with example.

Or

(b) Summarize the star cluster in detail.

15. (a) Discriminate the importance of pulsating theory.

Or

(b) Integrate the composition of universe.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Classify the types of planets.

Or

(b) Describe about the Van Allen belt.

17. (a) Discuss the salient features of asteroids.

Or

(b) Analyze the periodic comets.

18. (a) Explain the atmosphere of a sun.

Or

(b) Distinguish between photosphere and chromosphere.

19. (a) Explain the differences between star clusters and galaxies.

Or

(b) Categorize the types of galaxies.

20. (a) Facilitate the big bang theory.

Or

(b) Validate the steady state theory.

———————

(6 pages) Reg. No. : .....

Code No. : 10438 E **Sub. Code : CSPH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Third Semester

Physics

Skill Based Subject — MAINTENANCE OF ELECTRICAL APPLIANCES

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. One nanofarad is

(a) 1×10^{-12} F (b) 1×10^{-6} F

(c) 1×10^{-9} F (d) 1×10^{9} F

2. One Kilowatt in joule is

(a) one joule

(b) 10^6 joule

(c) 3.6×10^6 joule

(d) 1 unit of power consumed

3. Transformer oil should be

(a) thicker than water

(b) thinner than water

(c) moisture free

(d) viscous free

4. In a transformer, iron losses are measured by

(a) multimeter (b) short circuit test

(c) open circuit test (d) thermometer

5. The heating element in an electric water heater must have

(a) high melting point

(b) high resistivity

(c) low temperature coefficient of resistance

(d) all the above

6. The capacity of a voltage regulator is expressed in

(a) volt (b) KV

(c) VA (d) KVA

7. A.C can be converted into D.C with

(a) filter (b) inverter

(c) rectifier (d) all the above

8. Solar panels produce

(a) A.C power

(b) D.C power

(c) both A.C and D.C power

(d) none of the above

9. Switches should always be

(a) in the live wire

(b) in the neutral wire

(c) in the earth wire

(d) anywhere

10. RCD is

(a) Resistance Capacitance Devices

(b) Reverse Charge Devices

(c) Residual Current Devices

(d) None of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the construction and working of a galvanometer.

Or

(b) Explain the theory, how a galvanometer may be converted into a voltmeter.

12. (a) List out the uses of transformers.

Or

(b) Compare core type and shell type transformers.

13. (a) Explain the principle and working of an electrical fan.

Or

(b) Explain the principle and working of a washing machine.

14. (a) Give and explain the colour code for insulating wires.

Or

(b) Describe the production of A.C. and D.C.

15. (a) Describe the different types of switches and their uses.

Or

(b) Explain the wiring of the earth leak circuit breaker (ELCB).

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Describe different types of capacitors (any five).

Or

(b) Discuss air-core and ferrite core inductors. Point out their specific uses.

17. (a) Write in detail about classification of transformers.

Or

(b) Write about the maintenance of power transformers.

18. (a) Describe a fluorescent lamp and explain its working.

Or

(b) Give a layout diagram of (i) wet grinder and (ii) mixer. Describe their essential parts and their functions.

19. (a) Describe with a neat sketch three phase power generator and explain its working.

Or

(b) Discuss the various system of house wiring.

20. (a) Describe a ground fault protection method.

Or

(b) Explain the working of the circuit diagram of an inverter.

———————

(6 pages) Reg. No. : .....

Code No. : 10440 E **Sub. Code : CSPH 41**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Fourth Semester

Physics – Skill Based Subject

MAINTENANCE OF ELECTRONIC APPLIANCES

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. How many conductors does the capacitor consist of?
   (a) one (b) two
   (c) three (d) four

2. Colour bands for 1.5 ohms resistor will be
   (a) Brown green brown
   (b) Brown green golden
   (c) Brown golden green
   (d) Brown golden golden

3. CRO cannot be used to measure ———
   (a) frequency (b) phase
   (c) power (d) voltage

4. Which one of the following meters can be substitute a multi-meter?
   (a) Voltmeter (b) Ohmmeter
   (c) Both (a) and (b) (d) None of the above

5. The transducer used for the measurements are
   (a) Resistance temperature detectors
   (b) Thermistors
   (c) Ultrasonic
   (d) All the above

6. With the increase in the intensity of light, the resistance of photovoltaic cell
   (a) Increases (b) Decreases
   (c) Remains same (d) None of the above

7. What is the name for convert digital signal to analog signal?
   (a) Modulation (b) Demodulation
   (c) Bypass (d) Encapsulation

8. Identify the frequency of the crystal used for outgoing calls in mobile phones

(a) 26 MHz (b) 99 MHz

(c) 108 MHz (d) 5.5 MHz

9. Which of the materials is most used for the filaments in the incandescent?

(a) Tungsten (b) Silver

(c) Both (d) None of the above

10. A digital image is made up of thousands of

(a) Pixels (b) Bitmap

(c) Resolution (d) Vector images

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is colour coding? Give any two examples.

Or

(b) Write short notes about groove board, bread board and printed board.

12. (a) How to measure voltage, frequency, and phase in CRO?

Or

(b) Explain about waveforms and Lissajolle's figures.

13. (a) Discuss about resistive transducers.

Or

(b) Write short notes about piezoelectric transducers.

14. (a) What is mobile communication system? Explain it.

Or

(b) Describe MODEM. Explain it.

15. (a) How to transfer the data from camera to computer? Explain.

Or

(b) Explain about a camera.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Explain different types of resistors and write down its characteristics.

Or

(b) Explain different types of capacitors and write down its characteristics.

17. (a) Explain the principle and working theory of CRO.

Or

(b) Briefly explain digital storage oscilloscope.

18. (a) What is transducer? Briefly explain its characteristics.

Or

(b) Write in detail about light tranducers.

19. (a) Explain TV antennas and resonance antennas and discuss about its characteristics.

Or

(b) Explain mobile communication system and discuss working theory of mobile phone.

20. (a) Describe with a neat diagram, parts of camera and accessories.

Or

(b) Explain the working theory of flash photograph.

———————

(6 Pages) Reg. No. : .....

Code No. : 10042 E **Sub. Code : SAPH 21/ AAPH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Second/Fourth Semester

Physics — Allied

ALLIED PHYSICS — II

(For those who joined in July 2017–2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The material through which electric charge can easily flow is ————

(a) Quartz (b) Mica

(c) Germanium (d) Copper

2. If three 2Ω resistances are connected in series, the effective resistance will be

(a) 0 (b) 6Ω

(c) 8Ω (d) 2Ω

3. The relation connecting magnetic induction (B) and magnetic field intensity (H) is ————

(a) $\mu = B/H$ (b) $\mu = BH$

(c) $\mu = H/B$ (d) none

4. The coefficient of mutual inductance between a pair of coils ————, if the number of turns is high.

(a) high (b) small

(c) 0 (d) none

5. In the reverse bias of a diode, the resistance is ————

(a) very high (b) small

(c) 0 (d) none

6. The binary equivalent for the decimal number 7 is ———

(a) 110 (b) 101

(c) 111 (d) 001

7. Isotopes have ——— atomic number and ——— mass number.

(a) different - same (b) same - different

(c) same - same (d) even - odd

8. In the nuclear reaction $_{92}U^{234} + X \rightarrow _{92}U^{235} + Y$, X stands for

(a) proton (b) electron

(c) neutron (d) none

9. The horizontal distance covered by a projectile is large, if it is projected with an angle ———.

(a) 30° (b) 60°

(c) 45° (d) none

10. The mass of the particle travelling with velocity of light will be ———

(a) 0 (b) infinity

(c) 100 kg (d) none

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) State and explain ohm's law.

Or

(b) Explain the conversion of galvanometer in to a volt meter

12. (a) What are diamagnetic materials? Give any three properties of them.

Or

(b) State and explain Lenz's law.

13. (a) Explain the V- I characteristics of junction diode.

Or

(b) Draw the symbol and truth table for a NOR gate.

14. (a) Define mass defect and binding energy.

Or

(b) What are the fundamental laws of radioactivity?

15. (a) Derive the expression for the horizontal range of a projectile.

Or

(b) What are the postulates of special theory of relativity?

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) State and explain Krichoof's first and second laws.

Or

(b) Derive the expression for the condition for bridge balance in a Wheatstone bridge.

17. (a) Obtain an expression for the self inductance of a long solenoid.

Or

(b) Explain the determination of mutual inductance between a pair of coils using Ballistic Galvanometer.

18. (a) Explain the characteristics of Zener diode. How it is used as a voltage regulator?

Or

(b) State and explain DeMorgan's theorems.

19. (a) What are nuclear forces? Give their properties.

Or

(b) State and explain Soddy - Fajan's displacement law.

20. (a) Prove that the path of the projectile is a parabola.

Or

(b) Derive the Lorentz transformation equations.

(6 pages)

Reg. No. : .....

Code No.: 10028 E **Sub. Code: SMPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

First Semester

Physics – Core

MECHANICS AND RELATIVITY

(For those who joined in July 2017 – 2019)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. The gradient of a scalar point function is a

(a) Vector (b) Scalar

(c) 0 (d) None

2. The value of $\nabla.r =$ _____

(a) 0 (b) 1

(c) 3 (d) None

3. The rocket is based on the principle of low of conservation of _____

(a) Energy (b) Momentum

(c) Angular momentum (d) None

4. Change of momentum is called

(a) Pressure (b) Impulse

(c) Force (d) None

5. By perpendiculam axes theorem $I_z =$ _____

(a) $I_x I_y$ (b) $I_x + I_y$

(c) I_x / I_y (d) I_x

6. The moment of inertia of a solid sphere about its diameter is

(a) $2/5 MR^2$ (b) $2/10 MR^2$

(c) $1/5 MR^2$ (d) None

7. The unit for pressure is

(a) N/m (b) NM^{-2}

(c) NM^{-1} (d) Nm

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8. In continuity equation $a_1 v_1 =$ _____

(a) a_2/v_2 (b) v_2/a_2

(c) $a_2 v_2$ (d) $v^2 a^2$

9. Lorentz transformation equation shows that, length of an object along its direction of motion _____

(a) Increases (b) Decreases

(c) Constant (d) None

10. The velocity of light in free space is _____

(a) Constant (b) Not constant

(c) Zero (d) None

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Answer should not exceed 250 words.

11. (a) Prove that $\nabla \times r = 0$ $\left(r = x\vec{i} + y\vec{j} + z\vec{k}\right)$.

Or

(b) Prove that $\overline{\nabla}.\overline{r} = 3$ $\left(\overline{r} = x\vec{i} + y\vec{j} + z\vec{k}\right)$.

12. (a) Discuss the two body problem and define reduced mass.

Or

(b) State and explain work energy theorem.

13. (a) Derive the expression for kinetic energy of a rolling body on a smooth horizontal plane.

Or

(b) State and prove the perpendicular axis theorem.

14. (a) Derive the expression for the centre of pressure on a rectangular lamina.

Or

(b) State and explain equation of continuity.

15. (a) Explain time dilation due to relativistic effect.

Or

(b) Obtain Einsteins Mass-Energy relation.

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PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) State and prove Stoke's theorem.

Or

(b) State and prove Gauss divergence theorem.

17. (a) Explain the Kepler's III law of planetary motion.

Or

(b) Explain the working of a multistage rocket.

18. (a) Derive the expression for moment of inertia of a solid cylinder

(i) About its own axis

(ii) About an axis passing through its centre and perpendicular to its length.

Or

(b) Explain the working of a Gyrostat. Give its application.

19. (a) Describe and explain the working of venturi meter.

Or

(b) Explain the determination of metacentric height of a ship.

20. (a) Describe the Michelson-Morley experiment.

Or

(b) Derive the Lorentz transformation equations.

———————

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(6 pages)

Reg. No. :_____

Code No. : 10030 E Sub. Code : SMPH 21

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Second Semester

Physics — Core

THERMAL PHYSICS AND STATISTICAL MECHANICS

(For those who joined in July 2017 2019 only)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 1 = 10 marks)

Answer ALL questions,
choose the correct answer

1. The phenomena of super conductors was first discovered by

(a) KammerlinghOnnes

(b) Neilsbohr

(c) Richard Smalley

(d) Otto lehman

2. In mechanical refrigeration system, the refrigerant has the maximum temperature

(a) In evaporator

(b) Before expansion valve

(c) Between compressor and condenser

(d) Between condenser and evaporator

3. Diffusion can occur in———————materials

(a) solid (b) liquid

(c) gaseous (d) all of these

4. When is deviation more in the behaviour of a gas from the ideal gas equation PV = nRT

(a) At high temperature and low pressure

(b) At high temperature and high pressure

(c) At low temperature and low high pressure

(d) At low temperature and high pressure

5. A thermodynamic process where no heat is exchanged with the surroundings is

(a) isothermal

(b) adiabatic

(c) isobaric

(d) isotropic

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In a carnot cycle, the working medium receives heat at a ———— temperature.

(a) lower (b) higher

(c) constant (d) none of mentioned

Which of the following laws was expressed by Nernst?

(a) The first law of thermodynamics

(b) The second law of thermodynamics

(c) Third law of thermodynamics

(d) None of the above

The entropy is

(a) an intensive property

(b) an extensive property

(c) both (a) and (b)

(d) none of the above

Maxwell-Boltzmann law is for the _____

(a) Distinguishable particles

(b) Indistinguishable Particles

(c) Particles with half integral spin

(d) Particles with integral spin

10. Bosons have symmetrical wave functions. They do not obey ————

(a) Aufbau principle

(b) Pauli's Exclusion Principle

(c) Hund's Rule of Maximum Multiplicity

(d) Heisenberg's Uncertainty Principle

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Compare Helium I and II.

Or

(b) List out the applications of superfluidity.

12. (a) Derive an expression for pressure gas laws.

Or

(b) Narrate an essay on Vander Walls constant.

13. (a) State and prove Carnot's theorem.

Or

(b) Discuss about the working principle and efficiency of Otto Engine.

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4. (a) State and explain the third law of thermodynamics.

Or

(b) List out the applications for Maxwell's thermodynamics relation.

5. (a) Write a note on phase space.

Or

(b) Explain the Fermi–Dirae statistics distribution law.

SECTION C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe about the liquefaction of Helium.

Or

(b) Narrate an essay on adiabatic demagnetization of air conditioner.

17. (a) Explain the transport phenomena in gases.

Or

(b) Discuss about the laws for kinetic theory of gases.

18. (a) Calculate the work done during adiabatic and isothermal process.

Or

(b) Explain the working principle of Carnot's Engine.

19. (a) Describe about the effect of pressure on melting point and boiling point.

Or

(b) Explain the relation between Clausius Clapeyron equation and specific heat.

20. (a) Write an essay on thermodynamic probability.

Or

(b) Compare Maxwell Boltzmann, Bose-Einstein and Fermi- Dirac statistics distribution law.

———————

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(6 pages) Reg. No. : .....

Code No. : 10033 E **Sub. Code : SMPH 41/ AMPH 41**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Fourth Semester

Physics — Core

ELECTROMAGNETISM

(For those who joined in July 2017-2020)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The direction of induced emf can be found by
   (a) Laplace's law
   (b) Lenz's law
   (c) Fleming's right hand rule
   (d) Kirchhoffs voltage law

2. An inductor may store energy in
   (a) its electric field
   (b) its coils
   (c) its magnetic field
   (d) both in electric and magnetic fields

3. The magnetic field around a long straight current carrying wire is
   (a) unsymmetrical
   (b) cylindrical symmetry
   (c) spherical symmetry
   (d) cubical symmetry

4. Resistance can be measured with the help of
   (a) Wattmeters
   (b) Voltmeters
   (c) Ammeters
   (d) Ohmmeter and resistance bridges

5. Hysteresis loss is determined from
   (a) B/H curve (b) H/B curve
   (c) BH curve (d) B^2H curve

6. Poynting vector gives the
   (a) direction of polarization
   (b) rate of energy flow
   (c) intensity of electric field
   (d) intensity of magnetic field

7. Velocity of plane electromagnetic wave in vacuum is given by
   (a) $c = \sqrt{\mu_0}/\varepsilon_0$ (b) $c = \sqrt{\mu_0}\varepsilon_0$
   (c) $c = \frac{1}{\sqrt{\mu_0\varepsilon_0}}$ (d) $c = \sqrt{\mu/\varepsilon}$

8. Electromagnetic waves are transverse in nature is evident by
   (a) polarisation (b) interference
   (c) reflection (d) diffraction

9. The earth inductor is an instrument for measuring the
   (a) magnetic elements
   (b) strong magnetic field
   (c) only horizontal component of earth's field
   (d) H, V and dip

10. At the magnetic north pole of the earth, what is the value of the angle of dip?
    (a) zero (b) minimum
    (c) infinity (d) maximum

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) State and explain Faraday's law of electromagnetic induction.

    Or

    (b) Obtain an expression for coefficient of coupling between two coils.

12. (a) State amperes circuital law. Derive an expression for magnetic field inside a long solenoid.

    Or

    (b) With a neat diagram discuss the theory of Desauty bridge.

13. (a) Define $\overline{B}\,\overline{M}$ and $\bar{H}$. Establish the relation.

    Or

    (b) Write short notes on poynting vector.

14. (a) Define terms (i) Energy density and (ii) Momentum density.

Or

(b) Discuss briefly energy and momentum of electromagnetic waves.

15. (a) Discuss the theory of Earth inductor.

Or

(b) Write a note calibration of BG.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Describe a method of determining the mutual inductance between two coils of wire.

Or

(b) What are eddy currents? Give their practical applications.

17. (a) Obtain an expression for magnetic field along the axis of circular coil carrying current.

Or

(b) Give the theory and working of a moving coil Ballistic galvanometer.

18. (a) Explain what is hysteresis and describe loss of energy per cycle (hysteresis loss).

Or

(b) Derive Maxwell equations.

19. (a) Explain electromagnetic wave propagation of reflection and transmission at normal incidence.

Or

(b) Explain the phenomenon of polarisation by reflection.

20. (a) Explain how will you use it to determine vertical component of the earth's field.

Or

(b) Explain the induction coil and its uses.

———————

(6 pages) Reg. No. : .....

Code No. : 10036 E **Sub. Code : SMPH 53**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Fifth Semester

Physics — Core

ATOMIC PHYSICS

(For those who joined in July 2017-2019)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer:

1. The classical expression for the electrical conductivity of a metal in terms of mass of electron, change of electron, concentration of electrons and collision time is given by

(a) $mne\tau$ (b) $me\tau/n$

(c) $me^2\tau/m$ (d) $ne^2\tau^2/m$

2. The value of conductivity of metals σ is

(a) $\frac{ne^2\lambda V}{4T}$ (b) $\frac{ne^2\lambda V}{4\alpha T}$

(c) $\frac{n\alpha\lambda V}{4e^2T}$ (d) $\frac{ne^2\lambda VT}{4\alpha}$

3. All particles having the same e/m are focused at a single point in

(a) Thompson's method (b) Aston's method

(c) Bainbridge method (d) Dempster's method

4. The two isotopes obtained in Thomson parabola method belongs to

(a) Hydrogen (b) Neon

(c) Argon (d) Chlorin

5. Positive rays are also called as

(a) X-rays (b) Beta rays

(c) Canal rays (d) Gamma rays

6. The energy equivalent of a mass unit is

(a) 1 eV (b) 1 MeV

(c) 931 eV (d) 931 MeV

7. Number of splitting lines in normal Zeeman effect is

(a) 1 (b) 3

(c) Above 3 (d) None

8. Mosley law is

(a) $\gamma \propto z^2$ (b) $\gamma \propto z$

(c) $\gamma \propto \frac{1}{z}$ (d) $\gamma \propto \frac{1}{z^2}$

9. In the characteristic spectrum of X-rays

(a) $K_\alpha < K_\beta$ (b) $K_\alpha > K_\beta$

(c) $K_\alpha > L_\alpha$ (d) $K_\alpha = L_\alpha$

10. In Lave method

(a) X-rays of continuous wavelength are used

(b) X-rays of monochromatic wavelength is used

(c) X-rays of continuous wavelength and monochromatic wavelength are used

(d) Visible light of all wavelengths are used

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Derive an expression for thermal conductivity of metals.

Or

(b) Write a note on Wiedman- Franz's law.

12. (a) What are positive rays? Give its properties.

Or

(b) What is mass spectrograph? What are its uses?

13. (a) Give an account of vector atom model.

Or

(b) What are principal quantum number and orbital quantum number? Explain.

14. (a) Explain LS coupling and j-j coupling schemes.

Or

(b) Distinguish between normal and anamolous Zeeman effect.

15. (a) Derive Bragg's law.

Or

(b) What is Mosley law? State its importance.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the Millikan method for determining the electric charge.

Or

(b) Discuss in detail Band theory of solids.

17. (a) Describe Thompson's Parabola method and explain how e/m of the positive ion is calculated.

Or

(b) Describe Bainbridge mass spectrograph and explain how atomic masses are determined.

18. (a) State and explain Pauli's exclusion principle.

Or

(b) Describe how this principle assists in the interpretation of the periodic system of the elements.

19. (a) Describe Stern-Gerlach experiment. Discuss the importance of the results.

Or

(b) What is Zeeman effect? Discuss the quantum mechanical explanation of normal Zeeman effect.

20. (a) Describe the Powder crystal method of studying crystal structure.

Or

(b) Outline the theory of Compton Scattering and derive an expression for the Compton shift.

———————

(6 pages) Reg. No. : .....

Code No. : 10039 E **Sub. Code : SMPH 63**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Sixth Semester

Physics — Core

NUCLEAR PHYSICS

(For those who joined in July 2017–2019)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Radius of the atomic nucleus is ————
   (a) 10^{-14} to 10^{-15}m (b) 10^{-13} to 10^{-15}m
   (c) 10^{-12} to 10^{-13}m (d) 10^{-13} to 10^{-14}m

2. Calculated value of nuclear density ————
   (a) 1.886×10^{17} kgm^{-3} (b) 1.816×10^{17} kgm^{-3}
   (c) 1.888×10^{17} kgm^{-3} (d) 1.861×10^{17} kgm^{-3}

3. Radioactivity was discovered by Henry Becqerel in ————
   (a) 1869 (b) 1866
   (c) 1896 (d) 1899

4. The alpha particles are ———— charged.
   (a) Positively and Negatively
   (b) Neutrally
   (c) Negatively
   (d) Positively

5. Energy release in one fission ————
   (a) 300 MeV (b) 400 MeV
   (c) 100 MeV (d) 200 MeV

6. The atom bomb is due to an ———— Chain reaction.
   (a) Controlled (b) Uncontrolled
   (c) Both (a) and (b) (d) None

7. The efficiency formula for G.M. counter is
   (a) $\Sigma=1-e^{a/p}$ (b) $\Sigma=1+e^{a/p}$
   (c) $\Sigma=1-e^{ap}$ (d) $\Sigma=1-e^{a/}$

8. In a cloud chamber a liquid drop form in a supersaturated ————
   (a) Solid (b) Gas
   (c) Vapour (d) Liquid

9. The energy of the order of cosmic rays ————
   (a) 15 GeV (b) 51 GeV
   (c) 115 GeV (d) 11 GeV

10. The conversion of photon into a electron and positron is called ————
    (a) Annihilation
    (b) Pair Broken
    (c) Pair production
    (d) Ionisation

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the characterization of nuclear force.

    Or

    (b) Describe Proton —Neutron hypothesis.

12. (a) Distinguish between the alpha and beta rays.

    Or

    (b) Explain the laws of radioactive disintegration.

13. (a) To describe the kinematics of nuclear reaction.

    Or

    (b) Explain the term conservation of momentum.

14. (a) Describe term bubble chamber.

    Or

    (b) Explain the action of scintillation counter.

15. (a) Describe the latitude effect.

    Or

    (b) Briefly explain the particles and antiparticles.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the binding energy curve and its significance.

Or

(b) Describe construction and working of liquid drop model.

17. (a) Briefly explain the application of radio isotopes.

Or

(b) Explain the neutron theory of beta decay.

18. (a) To derive the value of energy release in fission reaction.

Or

(b) Explain the construction and working of nuclear reactor and uses.

19. (a) Explain the principle, construction and working of G.M Counter.

Or

(b) Explain the principle, construction and working of Betatron.

20. (a) Explain the cascade theory of cosmic ray showers.

Or

(b) Explain the following elementary particle quantum number.

(6 pages) Reg. No. : .....

Code No. : 10049 E **Sub. Code : SNPH 4 A/ ANPH 41**

U.G. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Physics

Non-Major Elective — BASIC PHYSICS — II

(For those who joined in July 2017-2020 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following best define nuclear forces?
   (a) The attraction between protons and neutrons
   (b) Repulsion between protons and neutrons
   (c) The attraction between protons and electrons
   (d) The attraction between electrons and neutrons

2. The principle of the atomic bomb is based on which of the given options?
   (a) Nuclear fusion (b) Nuclear fission
   (c) Radiation (d) None of these

3. Which of the following materials are diamagnetic?
   (a) Silver (b) Copper
   (c) Silver and Copper (d) Iron

4. In superconductivity, the electrical resistance of material becomes
   (a) Zero (b) Infinite
   (c) Finite (d) All of the above

5. What is the need to achieve population inversion?
   (a) To excite most of the atoms
   (b) To bring most of the atoms to ground state
   (c) To achieve stable condition
   (d) To reduce the time of production of laser

6. He-Ne laser is a type of _____.
   (a) Solid laser (b) Liquid laser
   (c) Gas laser (d) Diode laser

7. According to the special theory of relativity, physical laws are the same in frames of reference which
   (a) move at uniform velocity
   (b) accelerate
   (c) move in circles
   (d) move in ellipses

8. The wavelength of the matter waves is independent of :
   (a) mass (b) velocity
   (c) charge (d) momentum

9. The radix of an octal number system is :
   (a) 8 (b) 2
   (c) 16 (d) 10

10. The subtraction of these binary numbers 101001 – 010110 would generate :
    (a) 010010 (b) 011001
    (c) 100110 (d) 010011

PART B — (5 × 5 = 25 marks)

Answer ALL questions, by choosing (a) or (b).

Each answer should not exceed 250 words.

11. (a) Calculate the binding energy of a nucleus.

Or

(b) Describe about the properties of alpha rays.

12. (a) Appraise the properties of ferromagnetic materials.

Or

(b) Comment on conductors.

13. (a) Describe the important characteristic of laser beam.

Or

(b) List out the advantages of CO_2 laser.

14. (a) Generalize the physical significance of wave function.

Or

(b) Analyze the time dilation.

15. (a) Convert 215_8 into decimal.

Or

(b) Convert 10101_2 into an octal number.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, by choosing (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discriminate the radioactivity.

Or

(b) Explain about the nuclear fission.

17. (a) Distinguish dia and paramagnetic materials.

Or

(b) Justify the properties of superconductors.

18. (a) Explain the difference between spontaneous and stimulated emission of radiation.

Or

(b) Examine the working principle of CO_2 laser with suitable energy level diagram.

19. (a) Validate the reference frame.

Or

(b) Explain de Broglie concept of matter waves.

20. (a) Classify the number systems.

Or

(b) Subtract 11010 from 111101.

———————

(6 pages) Reg. No. : .....

Code No. : 10045 E **Sub. Code : SSPH 4 A/ ASPH 41**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

Fourth Semester

Physics — Skill Based Subject

MAINTENANCE OF ELECTRONIC APPLIANCES

(For those who joined in July 2017-2020)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions, Choose the correct answer :

1. To form 5 multiple capacitors, we needs _____ tin foils.

   (a) 4 (b) 5

   (c) 6 (d) None

2. _____capacitors are used for initial calibrating of equipment during manufacturing and servicing.

   (a) Ceramic (b) Paper

   (c) Multiplate (d) Trimmer

3. Lissajous pattern is a circle, if the frequency of the two signals are

   (a) equal

   (b) unequal

   (c) zero

   (d) infinite

4. The LCD digital display is based on

   (a) radiation of light

   (b) reflection of light

   (c) emission of light

   (d) transmission of light

5. Thermistors have _____temperature coefficient of resistance.

   (a) positive (b) negative

   (c) zero (d) none of the above

6. _____is a photo resistive material.

   (a) Indium arsenide

   (b) gallium arsenide

   (c) cadmium sulphide

   (d) cadmium arsenide

7. An antenna converts _____ to _____.

(a) photons, electrons

(b) electrons, photons

(c) electrons, neutrons

(d) both (a) and (b)

8. Which of the following are not used in mobile communication?

(a) wires

(b) cables

(c) wired antenna

(d) all the above

9. 'Camera Obscura' means

(a) dark room

(b) projector

(c) camera

(d) none of the above

10. When the shutter speed is increased

(a) images get brighter

(b) images get darker

(c) makes the subject move faster

(d) makes the subject move slower

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Give the characteristics of a resistor.

Or

(b) Explain how a PCB board can be prepared and give its drawbacks.

12. (a) Describe measurement of frequency using cathode Ray Oscilloscope.

Or

(b) Give the practical use of multimeters.

13. (a) Describe a variable air gap type capacitive transducer.

Or

(b) Write the difference between an active and passive transducer with example.

14. (a) Write the characteristics of a resonance antenna.

Or

(b) Explain the principle and working of a DTH.

15. (a) Explain the principle and working of a camera.

Or

(b) Give the specification of battery types used in flash photography.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe star connection and delta connection of capacitors and find the equivalent capacitance.

Or

(b) Discuss the different types of soldering techniques.

17. (a) Give the conditions for the formation of Lissajous figures. Describe demonstration of Lissajous figures with CRO.

Or

(b) Describe the construction and working of a Radio Frequency Oscillator.

18. (a) What is an inductive transducer? Explain the construction and working of an inductive transducer.

Or

(b) Explain how a photovoltaic cell acts as a light transducer.

19. (a) Discuss the basic concepts of radio transmitter and receiver.

Or

(b) Describe the working of a modem and give its function.

20. (a) Discuss the various elements of flash photography.

Or

(b) Write the characteristics of any two digital formats.

———————