

(6 pages)

Reg. No. : .....

Code No. : 6383

Sub. Code : ZPHM 11

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

First Semester

Physics – Core

CLASSICAL 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. \_\_\_\_\_ constraints are those which are expressible in the form of equation  $f(r_1, r_2, r_3, \dots, r_n, t) = 0$
- (a) Holonomic
  - (b) Nonholonomic
  - (c) Either holonomic and Nonholonomic
  - (d) None

2. D'Alembert's principle is based on the principle of \_\_\_\_\_
- (a) Virtual power
  - (b) Natural work
  - (c) Virtual work
  - (d) None
3. \_\_\_\_\_ between two particles are the most important examples of central force.
- (a) Gravitational and coulomb force
  - (b) Gravitational and Vanderwalls force
  - (c) Gravitational and Yukura force
  - (d) None
4. Coriolos forces are \_\_\_\_\_ forces
- (a) inertial
  - (b) non fictions
  - (c) noninertial
  - (d) None
5. The Poisson bracket of  $x$  with  $P_x[x, P_x] =$  \_\_\_\_\_
- (a) Zero
  - (b) one
  - (c)  $i\hbar$
  - (d)  $-i\hbar$

6. The principle of least action states that ———

- (a)  $\Delta \int_{t_1}^{t_2} \frac{T}{2} dt = 0$       (b)  $\Delta \int_{t_1}^{t_2} 2T dt = 0$   
 (c)  $\Delta \int_{t_1}^{t_2} (T - v) dt = 0$       (d)  $\Delta \int_{t_1}^{t_2} \sum_k p_k q_k dt = 0$

7. In small oscillators each oscillation with definite frequency is known as

- (a) Transverse vibration  
 (b) Longitudinal vibration  
 (c) Transverse and Longitudinal vibration  
 (d) Normal vibration

8. In the case of a rigid body having N particles, the number of degrees of freedom is

- (a) N      (b) 3N  
 (c) 3      (d) 0

9. Lorentz transformation are merely the orthogonal transform of four dimensional space and later recognized at space

- (a) Euclidian      (b) Hilbert  
 (c) Monkowski's      (d) None

10. Which one of the following remains invariant under Lorentz transformations

- (a)  $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} - \frac{1}{c^2} \frac{\partial^2}{\partial t^2}$   
 (b)  $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$   
 (c)  $\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} - \frac{1}{c^2} \frac{\partial}{\partial t}$   
 (d)  $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} + \frac{1}{c^2} \frac{\partial^2}{\partial t^2}$

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Find the Lagrange's equation of motion for an electrical circuit comprising an inductance L and capacitance C. The capacitor is charges to q coulombs and current flowing in the circuit is 'i,' Amp.

Or

- (b) State and explain principle of virtual work.

12. (a) Write short notes on coriolis force.

Or

(b) State and prove virial theorem.

13. (a) Deduce Hamilton's equation from variational principle.

Or

(b) Show that Lagrange's bracket is unvariant under canonical transformation?

14. (a) Derive Euler's equation of motion for a rigid body with fixed point.

Or

(b) Derive an expression for moment of inertia of Rigid body.

15. (a) Establish the mass-energy relation  $E = mc^2$ .

Or

(b) Discuss the relativistic Lagrangian formulation of relativistic mechanics.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) The homogeneity of time implies that the total energy is constant of motion substantiate.

Or

(b) Derive Lagrange's equation from Hamilton's principle.

17. (a) Discuss a two body problem reduced into one body problem. Calculate reduced mass of Hydrogen atom.

Or

(b) State and prove the Kepler's Law of planetary motion.

18. (a) Using Poisson bracket show that the transformation  $q = \sqrt{2p} \sin Q$   $p = \sqrt{2p} \cos Q$

Or

(b) Describe Hamilton-Jacobi theory and use it to solve the problem of linear harmonic oscillator.

19. (a) Discuss the vibrations of a linear triatomic molecule.

Or

(b) Explain in detail general theory of small oscillations.

20. (a) What is a four vector potential? Express Maxwell's field equations in four vector form.

Or

(b) Write the postulates of special theory of relativity. Also derive an expression for the variation of mass with velocity.

(8 pages)

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Code No. : 6384

Sub. Code : ZPHM 12

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

First Semester

Physics – Core

MATHEMATICAL 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 divergence of a vector field is always
  - (a) a vector
  - (b) a scalar
  - (c) some times a scalar and sometimes a vector
  - (d) neither a scalar nor a vector

2. If  $\phi = 4e^{(2x-y+z)}$ , then grad  $\phi$  at  $(1, 1, -1)$  is
  - (a)  $4(2\hat{i} - \hat{j} + \hat{k})$
  - (b)  $2\hat{i} - \hat{j} + \hat{k}$
  - (c)  $8\hat{i} - \hat{j} + 2\hat{k}$
  - (d)  $3\hat{i} + 6\hat{j} + 9\hat{k}$
3. Which of the following is the Laguerre's equation?
  - (a)  $\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx} - ny = 0$
  - (b)  $\frac{d^2y}{dx^2} - ny = 0$
  - (c)  $x\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx} + ny = 0$
  - (d)  $x\frac{d^2y}{dx^2} + ny = 0$
4. The value of  $P_1(x)$  is
  - (a) 1
  - (b) 0
  - (c)  $x^2$
  - (d)  $x$

5. Heat flow equation is

(a)  $\nabla^2 \phi = 0$

(b)  $\nabla^2 \phi = \frac{1}{h^2} \frac{\partial \phi}{\partial t}$

(c)  $\nabla^2 \phi = 1$

(d)  $\nabla^2 \phi = \frac{1}{c^2} \frac{\partial^2 \phi}{\partial t^2}$

6. Which of the following represents wave equation for the membrane?

(a)  $\frac{\partial^2 u}{\partial y^2} = \frac{1}{v^2} \frac{\partial^2 u}{\partial t^2}$

(b)  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 1$

(c)  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = \frac{1}{v^2} \frac{\partial^2 u}{\partial t^2}$

(d)  $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial y^2}$

7. If  $A_{ij}$  is anti symmetric tensor, then the component  $A_{11}$  is

(a) 1

(b) -1

(c) 2

(d) 0

8. The divergence of a contra variant vector  $A^\mu$  is

(a)  $A_{;\mu}^\mu$

(b)  $A; \mu$

(c)  $A$

(d)  $\nabla \phi$

9. From the pack of a 52 cards, one is drawn at random, the probability of getting a king is

(a)  $\frac{2}{13}$

(b)  $\frac{1}{169}$

(c)  $\frac{25}{169}$

(d)  $\frac{1}{13}$

10. The value of  $\Sigma f(x - \bar{x})$  is

(a) negative

(b) positive

(c) 0

(d) arbitrary

PART B — (5 × 5 = 25 marks)

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

11. (a) Check whether the following vector are linearly dependent or independent  $(1, 2, -3)$ ,  $(2, 5, 1)$ ,  $(-1, 1, 4)$ .

Or

- (b) Find a unit vector perpendicular to the surface  $x^2 + y^2 - z^2 = 11$  at the point  $(4, 2, 3)$ .

12. (a) Calculate the Wronskian of the functions  $e^{(p-iq)x}$  and  $e^{(p+iq)x}$ .

Or

- (b) State and prove the generating function for Laguerre polynomials.

13. (a) Solve the heat flow equation.

Or

- (b) A string of length  $l$  fixed at both ends is plucked at a distance  $d$  from one fixed point by an amount  $h$ . Find the displacement at any position at any instant of time.

14. (a) Show that the transformations of tensors form a group.

Or

- (b) Evaluate  $\nabla \times \nabla \phi$ .

15. (a) State and prove additive law of probability.

Or

- (b) The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seeds. Fit a Binomial distribution to these data:

$x$ :	0	1	2	3	4	5	6	7	8	9	10
$f$ :	6	20	23	12	8	6	0	0	0	0	0

PART C — (5 × 8 = 40 marks)

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

16. (a) Verify divergence theorem for the vector  $A = x^2 \hat{i} + y^2 \hat{j} + z^2 \hat{k}$  taken over the cube  $0 \leq x, y, z \leq 1$ .

Or

- (b) State and prove Stoke's theorem.

17. (a) Solve  $(1-x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + n(n+1)y = 0$ .

Or

(b) Show that

$$\int_{-1}^1 P_m(x)P_n(x) dx = 0 \text{ for } m \neq n$$

$$\int_{-1}^1 [P_n(x)]^2 dx = \frac{2}{2n+1}$$

18. (a) Solve the differential equation

$$2x \frac{\partial u}{\partial x} - 3y \frac{\partial u}{\partial y} = 0.$$

Or

(b) A string of length  $l$  with fixed ends is plucked up at its centre a distance  $h$  from the position of equilibrium and then released. Find

- (i) the displacement at any position at any time
- (ii) the normal frequencies and normal modes for the vibrating string.

19. (a) A covariant tensor has components  $xy$ ,  $2y-x^2$ ,  $xz$  in rectangular coordinates. Find its covariant components in spherical coordinates.

Or

(b) Derive Riemann - Christoffel tensor.

20. (a) Calculate:

- (i) the quartile
- (ii) the mean and
- (iii) the standard deviation wages from the following data:

Weakly wages in dollars :	35-36	36-37	37-38	38-39	39-40	40-41	41-42
No. of wage earners:	14	20	42	54	45	18	7

Or

(b) Derive the normal distribution as the limiting case of binomial distribution when  $p = q$ .

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Code No. : 6385

Sub. Code : ZPHM 13

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

First Semester

Physics – Core

INTEGRATED 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 the saturation region the  $I_D - V_{GS}$  characteristics of a MOSFET are \_\_\_\_\_  
(a) Linear                      (b) Quadratic  
(c) Exponential                (d) Hyperbolic
2. In reverse biased condition SCR behaves as \_\_\_\_\_  
(a) Diode                        (b) Transistor  
(c) JFET                         (d) MOSFET

3. If propagation delay time  $t_p = 10$  ns the outputs change approximately \_\_\_\_\_ after the arrival of the clock signal.

- (a) 20 ns                      (b) 15 ns  
(c) 10 ns                      (d) 5 ns

4. The circuit responds only where the clock is transition between its two voltage states \_\_\_\_\_

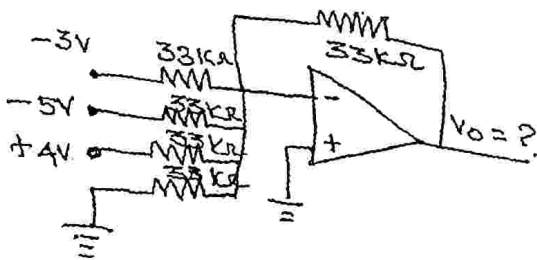
- (a) RC triggering            (b) Level triggering  
(c) Edge triggering         (d) None

5. Given a choice, integrators are almost invariably preferred over differentiators in analog circuits because

- (a) differentiators cause more noise at the output  
(b) differentiators don't allow frequency signals to pass  
(c) integrators are more immune to low frequency noise  
(d) the gain of a differentiator increases with frequency and therefore they are difficult to stabilize with respect to spurious oscillations



6. What is the expected output voltage in the following circuit?



- (a) +2V                      (b) -2V  
(c) +4V                      (d) -4V
7. Monostable multivibrator circuit is sometimes called as \_\_\_\_\_ multivibrator.
- (a) free running  
(b) one shot  
(c) neither free running nor one shot  
(d) none
8. A pulse train has a pulse width 5 ns and a period of 64 ns. Then the duty cycle is \_\_\_\_\_ percent.
- (a) 8.81                      (b) 7.81  
(c) 6.81                      (d) 5.81

9. Shielding is only effective against \_\_\_\_\_ fields if it provides a low impedance path to ground.
- (a) Electric                      (b) Magnetic  
(c) Electro-magnetic                      (d) Coloumb
10. Signal conditioning often requires the \_\_\_\_\_ signal to be filtered and isolated to remove unwanted back ground noise.
- (a) Output  
(b) Input  
(c) Neither input and output  
(d) None

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the operation of enhancement MOSFET with diagram.
- Or
- (b) A 100 μm thick silicon wafer has been doped uniformly with Boron of concentration  $\frac{10^{16}}{\text{cm}^3}$ . Find its sheet resistance. Given that for a p-type wafer  $\mu$  is given to be 100 μm and hole mobility in a silicon is 500 cm<sup>2</sup>/V-S.

12. (a) What does D-Flip flop do? Explain how JK flip-flop can be converted into D-Flip-flop with diagram and truth table.

Or

- (b) Draw the circuit of the integrated DTL gate and explain its operation for positive logic.
13. (a) Explain the action of voltage to current converter using Op-Amp.
- Or
- (b) Draw the circuit of an Op-Amp differentiator and explain its operation.
14. (a) Draw the internal block diagram of the 555 chip and explain.

Or

- (b) Discuss the application of PLL IC for frequency multiplication.
15. (a) Write short notes on electric field shielding.

Or

- (b) Explain the DC signal conditioning system with the help of block diagram.

PART C — (5 × 8 = 40 marks)

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

16. (a) List and explain the steps involved in fabricating a monolithic Integrated Circuit (IC) assuming already have a substrate.

Or

- (b) Explain the construction and VI characteristics of the Silicon Controlled Rectifier (SCR) as a function of Gate current.

17. (a) Explain the action of JK flip-flop with neat circuit diagram. Also explain, what is meant by race around condition in connection with JK flip-flop.

Or

- (b) Explain the action of a 4 bit ripple counter with circuit diagram and truth table. Also sketch the output waveforms.

18. (a) Sketch the simple hold circuit and explain its operation.

Or

- (b) What are the desirable characteristics of instrumentation amplifier and explain its operation with circuit diagram?

19. (a) Explain the action of IC voltage controlled oscillator using IC 566 with block diagram and circuit diagram.

Or

- (b) Explain the process of FSK demodulation using PLL.
20. (a) Write the principle of lock in amplifier. Explain the lock in amplifier with block diagram. Also explain the sensitivity of lock in amplifier.

Or

- (b) Define noise with reference to electrical system. Classify and explain the noise sources.
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Sub. Code : ZPHM 14

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

First Semester

Physics – Core

NONLINEAR DYNAMICS

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

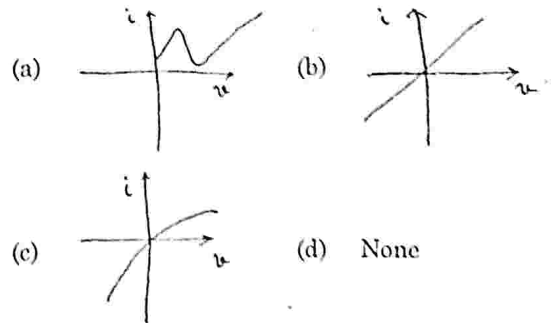
PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Linear superposition principle fails completely in \_\_\_\_\_ system.
- (a) Linear
  - (b) Nonlinear
  - (c) Linear and nonlinear
  - (d) None

2. The condition for underdamping is \_\_\_\_\_
- (a)  $2\omega_0 < \alpha < 0$
  - (b)  $0 < \alpha < -2\omega_0$
  - (c)  $0 < \alpha < 2\omega_0$
  - (d)  $-2\omega_0 < \alpha < 0$
3. When real parts of both eigen values are zero then the equilibrium point is \_\_\_\_\_
- (a) stable
  - (b) unstable
  - (c) neutral
  - (d) none
4. Saddle equilibrium point is \_\_\_\_\_
- (a) stable
  - (b) neutrally stable
  - (c) elliptic equilibrium
  - (d) unstable
5. The  $v-i$  characteristic curve of a nonlinear resistor is \_\_\_\_\_



6. AD 712 is an \_\_\_\_\_ device.

- (a) Analog
- (b) Digital
- (c) Analog and digital
- (d) None

7. The fractal dimension of sierpinski triangle is \_\_\_\_\_

- (a) 1.385
- (b) 1.485
- (c) 1.585
- (d) 1.685

8. Generally, chaotic attractors are \_\_\_\_\_

- (a) homogeneous
- (b) inhomogeneous
- (c) linear
- (d) nonlinear

9. \_\_\_\_\_ is an example for nonlinear Dispersive system.

- (a) Plucking the string on veena
- (b) Solitary waves on shallow surfaces
- (c) Earth quakes
- (d) None

10. Kortevog-de-vires equation is a simple \_\_\_\_\_ equation.

- (a) linear
- (b) homogeneous
- (c) inhomogeneous
- (d) nonlinear

PART B — (5 × 5 = 25 marks)

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

11. (a) For the following systems write equation of forces and state which of them are linear and which of them are nonlinear.

- (i) Anharmonic oscillator
- (ii) Damped Harmonic oscillator.

Or

(b) Discuss the motion of the damped linear oscillator.

12. (a) Discuss the occurrence of transcritical bifurcation in the system  $\dot{x} = -\mu x + x^2$ ,  $\dot{y} = -y$ .

Or

(b) What are limit cycles? Classify and explain limit cycles.

13. (a) Draw the circuit diagram of Bipolar Junction Transistor Colpitt's oscillator and its equivalent circuit. Also set the three autonomous differential equation.

Or

- (b) Write the state equation for linear resonant RLC circuit and construct the exact solutions of the system.

14. (a) Explain briefly the construction of Sierpinski triangle.

Or

- (b) Explain the construction and properties of Koch curve.

15. (a) Write down the properties of solitons.

Or

- (b) Obtain the general solution of the wave equation  $\frac{1}{e^2} \frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = 0$  where  $c^2 = \frac{k\alpha^2}{m}$  subject to the initial condition  $u(x, t) = \eta(x = n_{at})$ .

PART C — (5 × 8 = 40 marks)

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

16. (a) Distinguish and explain linear system and nonlinear system with specific examples.

Or

- (b) Obtain the frequency response relations and draw the primary resonance curves for

$$\ddot{x} + \alpha \dot{x} + \omega_0^2 x + \beta x^3 = f \sin \omega t$$

17. (a) Outline the fixed point stability analysis of the damped oscillator  $\ddot{x} + 2b\dot{x} + \omega_0^2 x = 0$  where  $b$  is the damping coefficient.

Or

- (b) Describe Pitchfork Bifurcation and also explain super critical and subcritical bifurcation diagrams.

18. (a) Discuss the nonautonomous MLC circuit with neat schematic diagram and carry out the stability analysis.

Or

- (b) Draw and study the dynamics of the nonlinear circuit having Chua's diode.

19. (a) Explain the construction and properties of :
- (i) Julia set and Mandelbrot set fractals.
  - (ii) Also write the applications of Fractals.

Or

- (b) What is meant by Multifractals? Explain how multifractal is constructed and characterized.
20. (a) Starting from Kdv equation, explain the solitary and cnoidal waves.

Or

- (b) Explain the numerical experiment of zobusky and krushal.
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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

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

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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

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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.

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[P.T.O.]



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.

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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.

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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
- Force constant
  - Masses of two atoms
  - Both (a) and (b)
  - None

7. Beer Lambert's law gives the relation between which of the following?
- Reflected radiation and concentration
  - Scattered radiation and concentration
  - Energy absorption and concentration
  - Energy absorption and reflected radiation
8. In which of the following ways, absorption is related to transmittance?
- Absorption is the logarithm of transmittance
  - Absorption is the reciprocal of transmittance
  - Absorption is the negative logarithm of transmittance
  - Absorption is a multiple of transmittance
9. NMR spectrometer provides \_\_\_\_\_ and \_\_\_\_\_ method of determining structure in soluble chemical compounds.
- Accurate, destructive
  - Accurate, non-destructive
  - Inaccurate, destructive
  - Inaccurate, non-destructive

2. The wave number difference between successive rotational levels of a rigid diatomic molecule is
- $2BJ$
  - $BJ(J+1)$
  - $2BJ(J+1)$
  - $2BJ(J-1)$
3. Which of the following absorb IR radiation?
- Homonuclear diatomic molecule
  - Heteronuclear diatomic molecule
  - Both (a) and (b)
  - Diatomic molecules will not absorb IR
4. Over tones are mainly observed in
- near IR
  - mid IR
  - far IR
  - Not in IR region
5. Which of the following cannot be conserved during Raman scattering?
- Total Energy
  - Momentum
  - Kinetic Energy
  - Electronic Energy
6. The Raman spectrum is said to consist of Stokes lines when \_\_\_\_\_
- $\Delta\nu > 0$
  - $\Delta\nu < 0$
  - $\Delta\nu = 0$
  - Does not depend on  $\Delta\nu$

Page 2 Code No. : 20300 E

10. What does "MRI" stand for?
- Magneto-Ray Idometry
  - Medical Radiometry Instrument
  - Magnetic Resonance Imaging
  - 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 diatomic 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 absorbance 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 unharmonic oscillator.

Or

(b) Describe about the vibration of polyatomic molecules.

Page 5 Code No. : 20300 E

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).

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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 cosmic 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 drop model
- (c) Quark model
- (d) Vector model

2. 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  $10^6 ms^{-1}$

3. The spin quantum number is

- (a)  $-1/2$
- (b) 2
- (c)  $1/2$
- (d)  $\pm 1/2$

4. 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)

5. The Wavelength of x-ray is

- (a)  $5 \text{ \AA}$  to 10
- (b) 10 to 0.5
- (c) 0.1 to 0.10
- (d) 0.5 to  $5 \text{ \AA}$

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 ammeter 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

Page 3 Code No. : 20302 E

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 galvanometer 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.

Page 4 Code No. : 20302 E  
 [P.T.O.]

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 losses.

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.

Page 5 Code No. : 20302 E

20. (a) Explain about the inverter.

Or

(b) Explain about the overloading devices.

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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 ammeter 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

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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 galvanometer 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.

Page 4 Code No. : 20302 E  
[P.T.O.]

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 losses.

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.

Page 5 Code No. : 20302 E

20. (a) Explain about the inverter.

Or

(b) Explain about the overloading devices.

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(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)  $90^\circ$  (b)  $180^\circ$   
(c)  $270^\circ$  (d)  $360^\circ$

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.

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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-Franz 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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(CBCS) DEGREE EXAMINATION, APRIL 2022.

Second 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 :

The rate of flow of electric charge is called as

- (a) Voltage
- (b) Resistance
- (c) Electric Current
- (d) Potential difference

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) electrons 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 to 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)  $2ug \sin \alpha$

- 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 induction
  - (d) steady current
- 4. Lenz devised a rule to 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

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- 10. The Special theory of relativity treats problems involving
  - (a) inertial 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 note 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.

Page 5 Code No. : 30622 E

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.

Page 6 Code No. : 30622 E



(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)  $\pm 5\%$  (b)  $\pm 10\%$   
(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 helium nucleus
  - A hydrogen nucleus
  - A proton
  - A positron
8. Radio carbon dating technique is used to estimate the age of \_\_\_\_\_.
- Soil
  - Fossils
  - Rocks
  - Buildings
9. Which of the following is not an example of projectile?
- A bullet fired from a gun
  - A kicked football
  - Taking off of an aircraft
  - 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
- Move at uniform velocity
  - Are accelerated
  - Move in circles
  - 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 — ( $5 \times 8 = 40$  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.

Page 5 Code No. : 20393 E

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.

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Page 6 Code No. : 20393 E

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

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
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  
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 (a) Bernoulli's theorem  
 (b) Boyle's law  
 (c) Newton's third law  
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PART B — ( $5 \times 5 = 25$  marks)

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

Each answer should not exceed 250 words.

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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.
-

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

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)  $V = \lambda f$

- 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

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 resonance.  
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 deflection.

Or

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

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(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 convex and concave lens  
(c) By using plano convex lens  
(d) All
3. By the principle of interference for constructive interference the path difference is  
(a)  $\lambda$  (b)  $\pi$   
(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)  $90^\circ$  (b)  $180^\circ$   
(c)  $270^\circ$  (d)  $360^\circ$
7. A frequency of 11HZ corresponds to
- (a) 1 vibration per sec  
(b) 2 vibrations per sec  
(c) 10 vibration  
(d) a time period of  $A\frac{1}{2}$  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 prism and deviation without dispersion.

Or

- (b) Explain constant deviation spectroscopy.

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.

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) Seebeck effect  
(c) Thomson effect (d) All of the mentioned
2. Coulomb is the unit of  
(a) Field strength (b) Charge  
(c) Capacitor (d) Force

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)  $\pi$
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.

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

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 an 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.

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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.
- 

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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

7. Which of the following is not a green house

- (a) CO<sub>2</sub> (b) CH<sub>4</sub>  
(c) CFC (d) H<sub>2</sub>

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) 1<sup>st</sup> December  
(b) 5<sup>th</sup> June  
(c) 22<sup>nd</sup> April  
(d) 1<sup>st</sup> January

10. Taj Mahal at Agra may be damaged by

- (a) Sulphur dioxide (b) Chlorine  
(c) Hydrogen (d) Oxygen

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 CO<sub>2</sub>.

- (a) 30 to 40 (b) 10 to 15  
(c) 5 (d) 2

## 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 fluorescent 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)

Answer 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.  
i) 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 :

- The material through which electric charge can easily flow is \_\_\_\_\_.  
(a) Quartz (b) Mica  
(c) Germanium (d) Copper
- If three  $2\Omega$  resistances are connected in series, the effective resistance will be  
(a) 0 (b)  $6\Omega$   
(c)  $8\Omega$  (d)  $2\Omega$
- 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  ${}_{92}\text{U}^{234} + \text{X} \rightarrow {}_{92}\text{U}^{235} + \gamma$ , 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)  $30^\circ$  (b)  $60^\circ$   
 (c)  $45^\circ$  (d) none
10. The mass of the particle travelling with velocity of light will be \_\_\_\_\_.  
 (a) 0 (b) infinity  
 (c) 100 kg (d) none

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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  $\mu$  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)  $\gamma$  - rays (d) All
8. The relation between half - life time ( $\tau$ ) and mean life ( $T$ ) 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)  $L = I_0(1 - v^2)$  (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 ( $\mu$  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. : .....

Code 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)

Time : 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-renewable 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 latent heat

- (a) Thermal energy (b) Chemical energy  
(c) Electrical energy (d) Mechanical energy

The value of solar constant is

- (a) 1347 w/m<sup>2</sup> (b) 1357 w/m<sup>2</sup>  
(c) 1367 w/m<sup>2</sup> (d) 1388 w/m<sup>2</sup>

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

Page 2 Code No. : 30333 E

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 Flat 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.

Reg. No. : .....

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

(CBCS). DEGREE EXAMINATION, APRIL 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 :

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

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)**

Answer 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

3. Ampere's circuital law is given by

- (a)  $\oint \vec{H} \cdot d\vec{l} = \mu_0 \vec{I}$  (b)  $\oint \vec{B} \cdot d\vec{l} = \mu_0 I$   
(c)  $\oint \vec{B} \cdot d\vec{l} = \mu_0 J$  (d)  $\oint \vec{H} \cdot d\vec{l} = \mu_0 J$

4. The deflection  $\theta$  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)  $S = E \times B$  (b)  $S = E \times B/2$   
(c)  $S = E \times B/\mu_0$  (d)  $S = E \times B/2\mu_0$

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

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 energy relations of electromagnetic 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

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 :

- Electromagnetic induction is not used in \_\_\_\_\_  
(a) Transformer (b) Room heater  
(c) AC generator (d) Choke coil
- The self inductance of a straight conductor is \_\_\_\_\_  
(a) zero (b) infinity  
(c) very large (d) very small

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)  $0.3 \times 10^{-3} \text{T}$  (b)  $0.38 \times 10^{-4} \text{T}$   
(c)  $1.38 \times 10^{-4} \text{T}$  (d)  $0.38 \text{T}$

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 an expression for the self-inductance of a long solenoid.

3. The S.I unit of magnetic flux density

- (a) T (b)  $\text{wb/m}^2$   
(c) wb (d)  $\text{wb/m}$

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)  $\vec{F} = q[(\vec{V} \times \vec{B}) + \vec{E}]$

5. Unit of magnetization is \_\_\_\_\_

- (a) Am (b)  $\text{Am}^{-3}$   
(c)  $\text{Am}^{-1}$  (d)  $\text{Am}^{-2}$

6. Velocity of plane electro magnetic wave in vacuum is

- (a)  $c = \sqrt{\mu_0 / \epsilon_0}$  (b)  $c = \sqrt{\mu_0 \epsilon_0}$   
(c)  $c = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$  (d)  $c = \sqrt{\epsilon_0 / \mu_0}$

7. Polarization shows the \_\_\_\_\_ nature of light.

- (a) Longitudinal (b) Transverse  
(c) Dual (d) None

Page 2 Code No. : 20033 E

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 ( $\mu$ ) 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.

Page 5 Code No. : 20033 E

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.
- 

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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 Norton's current source
- Short the load resistor
  - Disconnect the load resistor
  - Short the voltage source
  - Open the voltage source

7. The common mode gain is
- very high
  - very low
  - always unity
  - unpredictable
8. In a Colpitt's oscillator, the feedback is obtained
- by magnetic induction
  - by a tickler coil
  - from the center of split capacitors
  - none of these
9. In ideal op - amp the I/P impedance is \_\_\_\_\_
- infinite
  - zero
  - 1
  - constant
10. The gain of an actual op - amp is around
- 10,00,000
  - 1,000
  - 100
  - 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?

Page 3 Code No. : 20034 E

2. In ideal current source the output current is
- zero
  - constant
  - dependent on load
  - dependent on internal resistance
3. For break down in zener diode the requirement is
- forward bias
  - reverse bias
  - both forward and reverse bias
  - none
4. The ac beta given by  $\beta_{ac} = \frac{\Delta I_C}{\Delta I_B}$
- $\Delta I_C / \Delta I_B$
  - $\Delta I_C \times \Delta I_B$
  - $\Delta I_E / \Delta I_B$
  - $\Delta I_E \times \Delta I_B$
5. A MOSFET has \_\_\_\_\_ terminals.
- two
  - five
  - four
  - three
6. In a P - channel JFET, the charge carriers are
- electrons
  - holes
  - both electrons and holes
  - none of these

Page 2 Code No. : 20034 E

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.

Page 4 Code No. : 20034 E  
[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) 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.

Page 5 Code No. : 20034 E

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

Or

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

Page 6 Code No. : 20034 E



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 Norton's current source
- Short the load resistor
  - Disconnect the load resistor
  - Short the voltage source
  - Open the voltage source

7. The common mode gain is
- very high
  - very low
  - always unity
  - unpredictable
8. In a Colpitt's oscillator, the feedback is obtained
- by magnetic induction
  - by a tickler coil
  - from the center of split capacitors
  - none of these
9. In ideal op - amp the I/P impedance is \_\_\_\_\_
- infinite
  - zero
  - 1
  - constant
10. The gain of an actual op - amp is around
- 10,00,000
  - 1,000
  - 100
  - 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?

Page 3 Code No. : 20034 E

2. In ideal current source the output current is
- zero
  - constant
  - dependent on load
  - dependent on internal resistance
3. For break down in zener diode the requirement is
- forward bias
  - reverse bias
  - both forward and reverse bias
  - none
4. The ac beta given by  $\beta_{ac} = \frac{\Delta I_C}{\Delta I_B}$
- $\Delta I_C / \Delta I_B$
  - $\Delta I_C \times \Delta I_B$
  - $\Delta I_E / \Delta I_B$
  - $\Delta I_E \times \Delta I_B$
5. A MOSFET has \_\_\_\_\_ terminals.
- two
  - five
  - four
  - three
6. In a P - channel JFET, the charge carriers are
- electrons
  - holes
  - both electrons and holes
  - none of these

Page 2 Code No. : 20034 E

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.

Page 4 Code No. : 20034 E  
[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) 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.

Page 5 Code No. : 20034 E

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

Or

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

Page 6 Code No. : 20034 E

Reg. No. : .....

Code 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)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

The hexadecimal number corresponding to the binary number (11110010)<sub>2</sub> is

- a) F5 (b) C2
- c) F2 (d) C5

The gray code corresponding to binary (1100)<sub>2</sub> is

- a) 1011 (b) 1001
- c) 0111 (d) 1010

Circuit that changes a code into a set of signals called

- (a) encoder (b) decoder
- (c) multiplexer (d) dataselector

Decimal counter has \_\_\_\_\_ states.

- (a) 5 (b) 10
- (c) 15 (d) 20

The error in the D/A converter output may be due

- (a) Errors in the values of resistors used
- (b) Monotonicity
- (c) Small resolution
- (d) Its higher D/A speed

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

Encode the decimal number to excess - 3 code.

- (i) 46
- (ii) 327.89
- (iii) 20.305.

Or

Page 3 Code No. : 30314 E

- 3. The Boolean equation  $\overline{A + B + C}$  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

Page 2 Code No. : 30314 E

(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.

Page 4 Code No. : 30314 E

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

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

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 :

- The binary equivalent of the octal number 23 is  
(a)  $(010\ 010)_2$  (b)  $(101\ 011)_2$   
(c)  $(010\ 011)_2$  (d)  $(111\ 010)_2$
- The result of the addition  $2_{10} + 5_{10}$  in excess code is  
(a) 1101 (b) 1010  
(c) 1011 (d) 1001

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

- 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.

- (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.

- Which of the following gates cannot be used as an inverter?  
(a) NAND (b) AND  
(c) NOR (d) EXNOR
- $AB + \bar{A}C + BC$  is equivalent to  
(a)  $AB + BC$  (b)  $AB + \bar{A}C$   
(c)  $\bar{A}C + BC$  (d)  $AC$
- How many binary bits are added at a time in a full adder?  
(a) 2 (b) 3  
(c) 4 (d) 6
- The flip-flop which eliminates the Race condition  
(a) R-S (b) J-K  
(c) T-flipflop (d) Master slave
- The code used for labeling the cells of the K-map  
(a) Natural BCD (b) Hexadecimal  
(c) Gray (d) Octal
- A demultiplexer can be used to realize a  
(a) counter  
(b) shift-register  
(c) combinational circuit  
(d) display system

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- (a) Prove the Boolean identities  
(i)  $AC + ABC = AC$   
(ii)  $A + \bar{A}B = A + B$ .  
Or  
(b) Describe NOR gate with circuit and truth table.
- (a) Describe Half subtractor with truth table.  
Or  
(b) Describe frequency divider in multivibrator.
- (a) Explain maxterm and minterm in Boolean variables.  
Or  
(b) Describe decoder with a diagram.
- (a) Explain Parallel in serial out converter shift register.  
Or  
(b) Explain MOD-5 counter with a diagram.

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[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) 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.

Page 5 Code No. : 20037 E

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. : .....

Code 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)  $6.226 \times 10^{-27}$  joule – sec
- (b)  $6.626 \times 10^{-27}$  erg – sec
- (c)  $6.226 \times 10^{-34}$  erg – sec
- (d)  $6.626 \times 10^{-34}$  joule – sec

Where is the maximum intensity observed in Fraunhofer 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)  $-i\hbar \times \nabla$  (b)  $i\hbar \times \nabla$
- (c)  $i\hbar \times \nabla$  (d)  $-i\hbar \nabla$

Hamiltonian operator is

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

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)  $L > x > 0$

- 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)  $\Delta p \geq \hbar$

Page 2 Code No. : 30315 E

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  $\psi$ .

15. (a) Calculate the permitted energy levels of an electron in a box of  $1 \times 10^{-10}$  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.

Page 5 Code No. : 30315 E

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  $\Delta L \cdot \Delta \phi \geq \hbar$ .

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

Or

(b) Evaluate the 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. : .....

Code 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)

Time : 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 meson  $275 \times$  mass of \_\_\_\_\_

- (a) Proton                                (b) Electron  
 (c) Neutron                               (d) Positron

The insensitive period of G.M. counter is \_\_\_\_\_

- a) 100 to 200  $\mu s$   
 b) 300 to 400  $\mu s$   
 c) 200 to 400  $\mu s$   
 d) 400 to 500  $\mu s$

In a bubble chamber a vapour bubbles forms in a superheated \_\_\_\_\_

- a) Vapour                                 (b) Gas  
 c) Solid                                    (d) Liquid

East-west effect is maximum at the \_\_\_\_\_

- a) Edge                                    (b) Pole  
 c) Middle                                 (d) Equator

The variation of cosmic ray intensity with altitude is called \_\_\_\_\_

- a) Latitude effect                        (b) Azimuth Effect  
 c) Altitude effect                        (d) None

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

Page 2 Code No. : 30316 E

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 meson 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.

Page 5 Code No. : 30316 E

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.

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(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

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

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

Page 2 Code No. : 20039 E

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  $\beta$ -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.

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Page 4 Code No. : 20039 E

[P.T.O.]

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.

Page 5 Code No. : 20039 E

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.
- 

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Pages)

Reg. No. : .....

Code 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)

Time : 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

The transition temperature of mercury is

- a) 1 K (b) 1.14 K  
c) 4.12 K (d) 9.22 K

1 mm = \_\_\_\_\_ nm.

- a)  $10^6$  (b)  $10^{-6}$   
c)  $10^7$  (d)  $10^{-7}$

The diameter of bucky ball is about \_\_\_\_\_

- a) 1 Å (b) 10 Å  
c) 100 Å (d) 1000 Å

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

(a) Describe the face centered cubic structure.

Or

State and explain Bragg's law.

Page 3 Code No. : 30317 E

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

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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 Fullerene nanotubes.

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[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) 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 × 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)  $\infty$
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 × 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<sub>2</sub> 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 45 into 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.

Page 5 Code No. : 20049 E

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  $9.11 \times 10^{-31}$  kg moves at the speed of  $3 \times 10^8$  m/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.

Page 6 Code No. : 20049 E

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) mobile 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 computer.

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.

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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.

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