



VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

(Autonomous & Residential)

[Affiliated to Madurai Kamaraj University]

B.Sc. Mathematics Degree (Semester) Examinations, November 2019

Part – III : Allied Subject : First Semester : Paper – I

ALLIED PHYSICS – I

Under CBCS – Credit 4

Time: **3** Hours

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- The term SONAR stands for _____.
 a) Sky Navigation and Ranging b) Sound Navigation and Ranging
 c) Sound Noise Ratio d) Sound Air Ratio
- The noise which produced inside the hall is called _____.
 a) Air borne noise b) structure borne noises
 c) Echelon effect d) inside noises
- The SI unit of surface tension is _____.
 a) Nm^{-2} b) Nm^{-1} c) Nm d) Cm
- A liquid motion when the velocity at every point in the liquid is not constant and its magnitude is large
 a) Critical velocity b) streamline motion
 c) turbulent motion d) linear motion
- The total gain in entropy of the working substance in a Carnot's cycle is
 a) Zero b) negative c) positive d) none of the above
- An adiabatic process occurs at constant
 a) temperature b) pressure c) heat d) none of these

7. A capacitor is a device for storing
 a) current b) voltage c) magnetic field d) charge
8. Which is used to make or break an electric circuit
 a) fuse b) voltmeter c) potentiometer d) switch
9. The angle of incidence for which the angle of refraction is 90° is called the
 a) normal angle b) reflected angle
 c) critical angle d) refracted angle
10. The condition for minimum spherical aberration for two lenses separated by a distance is
 a) $f_2 - f_1$ b) $f_1 - f_2$ c) f_2 / f_1 d) f_1 / f_2

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. What is meant by reverberation time?
12. State Hooke's law.
13. Define coefficient of viscosity of a liquid. State its unit and dimension.
14. Define efficiency of a heat engine.
15. What is a relay?
16. Write about fuse in electric circuit.
17. State the laws of refraction.

SECTION – C

Answer ALL Questions :

(5 × 5 = 25)

18. a) Summarize the uses and applications of ultrasonic waves.

(OR)

- b) Calculate the frequency of the fundamental mode of a string 1 m

long weighing 2 g loaded with 40 g in Melde's string experiment (longitudinal mode).

19. a) Demonstrate in detail Jaeger's method for the determination of surface tension of water.

(OR)

- b) In a Jaeger type of experiment to measure the surface tension of a liquid, the vertical capillary tube of radius 0.0005 m was dipped inside a liquid of density 1100 kg/m^3 to a depth 0.04 m below its surface. When an air bubble was formed at the end of the capillary tube dipping inside the liquid, it was observed from manometric reading that the pressure inside the bubble exceeded the atmospheric pressure by 0.00547 m of mercury. Calculate the surface tension of the liquid.

20. a) Illustrate the concept of entropy with its definition.

(OR)

- b) Calculate the change in entropy when 5 kg of water at 100°C is converted into steam at the same temperature.

21. a) Explain the principle of a capacitor.

(OR)

- b) A circular coil has a radius of 0.1 m and a number of turns of 50. Calculate the magnetic induction at a point
 i) on the axis of the coil and distance 0.2 m from the centre
 ii) at the centre of the coil, when a current of 0.1 A flows in it.

22. a) What is coma? How is it illuminated?

(OR)

b) Find the angle of a crown glass prism to be combined with a flint glass prism of refracting angle 5° so that the resultant dispersion between C and F lines of the spectrum may be zero. Find also the deviation for the mean ray given that.

	Crown glass	Flintglass
n_f	1.5233	1.6385
n_c	1.5146	1.6224

SECTION – D

Answer any THREE Questions : **(3 × 10 = 30)**

23. Solve with necessary theory, the composition of two simple harmonic motions of equal time periods at right angles to each other. Discuss the different important cases.
24. Describe the experiment to find the rigidity modulus of a wire experimentally by using the torsion pendulum.
25. State and explain
 - i) second law of thermodynamics
 - ii) third law of thermodynamics
26. Solve the expression for the field along the axis of a circular coil carrying current.
27. What is spherical aberration? Give the methods of minimizing spherical aberration.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Core Subject : First Semester : Paper – I

MECHANICS

Under CBCS – Credit 4

Time: **3** Hours

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- If the slope of velocity-time graph gradually decreases, then the body is said to be moving with:
 - Positive acceleration
 - Negative acceleration
 - Uniform velocity
 - Variable velocity
- In SI units a force is numerically equal to the _____, when the force is applied to it.
 - velocity of the standard kilogram
 - speed of the standard kilogram
 - velocity of any object
 - acceleration of the standard kilogram
- The direction of linear velocity of body moving in a circle is
 - Along the axis of rotation
 - Along the tangent
 - Directed towards the center
 - Directed away from the center
- Frictional and Normal forces are always directed _____ to one another
 - Parallel
 - perpendicular
 - equal
 - opposite
- When you step on the accelerator to increase the speed of your car, the force that accelerates the car is:
 - the force of your foot on the accelerator
 - the force of friction of the road on the tires
 - the force of the engine on the drive shaft
 - the normal force of the road on the tires

6. If an object has spherical symmetry, its centre of mass lies at the _____ of the sphere.

- a) axis b) geometrical centre
- c) plane d) outer surface

7. Total angular momentum and angular velocity are parallel in rigid bodies with _____ symmetry.

- a) temporal b) spatial c) axial d) coaxial

8. The rotational inertia of a wheel about its axle does not depend upon its:

- a) diameter b) mass
- c) distribution of mass d) speed of rotation

9. The study of properties of fluids in motion is called

- a) Flow analysis b) Fluid statics c) Fluid dynamics d) None

10. In equation of continuity, the unit of Av is given as:

- a) Cubic meter b) Cubic meter per second
- c) Square meter per second d) Square meter

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. Give the equation describing free falling body.

12. Write the Newton's laws in three dimensional vector form.

13. Define linear momentum.

14. Obtain the relation between angular momentum and angular velocity.

15. What do you mean by average power and instantaneous power?

16. Define bulk modulus.

17. What are general characteristics of fluid flow?

SECTION – C

Answer ALL Questions :

(5 × 5 = 25)

18. a) Illustrate with experiment the relation between work, force and acceleration.

(OR)

b) A 900kg car is going 20m/sec along a road. How large a constant retarding force is required to stop it in a distant of 30m.

19. a) Explain the terms coefficient of static friction and coefficient of dynamic friction.

(OR)

b) Find the velocity an artificial satellite must have to pursue a circular orbit around the earth just above the surface.

20. a) Discuss elastic collision using momentum conservation.

(OR)

b) A 1,088.64 Kg car strikes a fence at 9.144 m/s and comes to a stop in 1 sec. What average force acted on a car?

21. a) How angular momentum is conserved for the springboard diver?

(OR)

b) A body of mass $m = 4.5g$ is dropped from rest at a height $h = 10.5m$ above the earth's surface neglecting air resistance. What will its speed be just before it strikes the ground.

22. a) Discuss a method to measure the pressure exerted by a fluid.

(OR)

- b) What is the pressure at the bottom of a swimming pool 6ft deep that is filled with fresh water?
(density of sea water is $1.03 \times 10^3 \text{ kg/m}^3$).

SECTION – D

Answer any THREE Questions : **(3 × 10 = 30)**

23. Describe any four possible kinds of motion with equation in one dimension.
24. Obtain position, velocity and acceleration for a falling body subject to a drag force.
25. Apply conservation of momentum for a system of particles.
26. Explain work-energy theorem.
27. Obtain Bernoulli's equation.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Core Subject : First Semester : Paper – II

ELECTROMAGNETISM

Under CBCS – Credit 4

Time: **3** Hours

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- The angle between the normal to the plane of the coil and the direction of the field is
a) zero b) 45° c) 60° d) none of these
- The magnitude of the dipole moment p is given by the product of any one of the charges and the _____ between them
a) volume b) height c) distance d) mass
- If the charge is placed at infinity, its potential is
a) Zero b) infinity c) one d) negative value
- Which of the following element used as a dielectric medium in mica capacitor
a) air b) mica c) aluminium d) metal sheet
- Current density J is _____ quantity
a) scalar b) vector c) both (a) & (b) d) none of the above
- Which of the following bridge can be used to measure very low resistance?
a) Wein bridge b) Maxwell bridge
c) Schering bridge d) Carey Foster bridge

7. The SI unit of Magnetic flux is
 a) Wbm^2 b) Wb/m^2 c) Weber d) Wb/m^3
8. According to the left hand thumb rule, direction of what is indicated by the thumb?
 a) magnetic field b) electric current
 c) deflecting force d) magnetic flux
9. The parallel resonant circuit is known as _____.
 a) acceptor circuit b) rejector circuit
 c) divider circuit d) all of the above
10. It is a device for converting a low alternating voltage at high current into a high alternating voltage at low current and vice versa
 a) Choke coil b) Tesla coil c) Transformer d) oscillator

SECTION – B

Answer any FIVE Questions : **(5 × 2 = 10)**

11. Define electric dipole.
12. State Coulomb's theorem.
13. Define electric potential.
14. Calculate the Capacitance of a sphere of 20cm diameter inside which there is an earth connected sphere of 10cm diameter, the medium between the spheres being air.
15. Define temperature Coefficient of resistance.
16. Compare the electrostatic field and magnetic field.
17. What is choke coil?

SECTION – C

Answer ALL Questions : **(5 × 5 = 25)**

18. a) Derive an expression for the electric field at a point on the axial line due to an electric dipole.
(OR)
 b) A positive charge of $q_1 = 2 \times 10^{-7} \text{C}$ is placed at a distance of 0.15m from another positive charge of $q_2 = 8 \times 10^{-7} \text{C}$. At what point on the line joining them is the electric field zero .
19. a) Derive an expression for the capacitance of a parallel plate capacitor.
(OR)
 b) Find the potential at the centre of a 10m square having charges $q, -2q, 3q$ and $2q$ at its corners.
20. a) Obtain an expression for equation of continuity.
(OR)
 b) A copper wire of diameter 0.5mm and length 20m is connected across a battery of emf 1.5V and internal resistance 1.25Ω . Calculate the current density in the wire and the drift velocity V_d , assuming one Conduction electron per atom of Copper. What is the heat dissipated per metre of the wire?
21. a) Derive an expression for magnetic induction at a point due to a straight Conductor Carrying Current.
(OR)
 b) A solenoid of 1200 turns is wound uniformly in a single layer on a glass tube 2m long and 0.2m in diameter. Find the magnetic induction at the centre of the solenoid. When a current of 2A flows through it.

22. a) Describe the Construction and working of A.C. dynamo.

(OR)

b) An electric lamp which runs at 100 *Volts* D.C and 10 *amp* current is connected to 220 *Volts* 50 *Hz* AC mains. Calculate the inductance of the choke in the circuit.

SECTION – D

Answer any THREE Questions :

(3 × 10 = 30)

23. Applying Gauss law, find electric field due to uniformly charged sphere.

24. A Capacitor Consists of two Concentric spheres. Calculate the Capacitance when

a) the inner sphere is charged and the outer sphere earthed.

b) the outer sphere is charged and the inner sphere earthed.

25. Explain with necessary theory how a Carey Foster bridge may be used to compare two nearly equal resistances. Hence show how the specific resistance of the material of the wire can be determined.

26. Give the construction of a moving coil ballistic galvanometer. Derive an expression between the quantity of charge flowing through it and the throw obtained.

27. Explain LCR series resonance circuit.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Core Subject : Third Semester : Paper – I

PRINCIPLES OF ELECTRIC CIRCUITS

Under CBCS – Credit 4

Time: **3** Hours

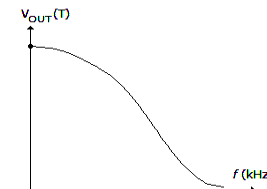
Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- Two parallel resistors both having their values 28 ohms are connected in parallel. The overall current provided by the 28 V source is
a) 1 A b) 2 A c) 4 A d) 8 A
- According to Millman's Theorem, if there are n voltage sources with n internal resistances respectively, are in parallel, then these sources are replaced by?
a) single current source I' in series with R'
b) single voltage source V' in series with R'
c) single current source I' in parallel to R'
d) single voltage source V' in parallel to R'
- The positive angle of 20° is equivalent to the negative angle of
a) -160° b) -340° c) -70° d) -20°
- The length of the phasor represents?
a) Magnitude of the quantity b) Direction of the quantity
c) Neither magnitude nor direction d) Either magnitude or direction
- Which circuit is represented by the frequency response curve in the given figure?



- a) High-pass filter b) low -pass filter
c) Band-pass filter d) Band-stop filter
6. An ac circuit consists of a resistor and a capacitor. To increase the phase angle above 45° , the following condition must exist
a) $R > X_C$ b) $R = X_C$ c) $X_C > R$ d) $X_C < R$
7. What is the magnitude of the phase angle of a 24 Vac parallel RL circuit when $R = 45 \Omega$ and $X_L = 1100 \Omega$?
a) 0.001° b) 2.3° c) 87.6° d) 89.9°
8. When the frequency of the voltage applied to a series RL circuit is increased, the phase angle
a) increases b) does not change
c) decrease d) cannot determined without values
9. A certain series resonant circuit has a bandwidth of 1 kHz. If the existing coil is replaced with one having a lower value of Q, the bandwidth will
a) increase b) decrease
c) remain the same d) to more selective
10. At the critical frequency, the phase shift through a high-pass filter is
a) 90° b) 0° c) 45° d) dependent on the reactance

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. State superposition theorem.
12. State Thevinin's theorem.
13. Define duty cycle.
14. Convert $8 + j6$ to polar form.
15. Calculate the capacitive susceptance where $f = 1000 \text{ Hz}$, $c = 0.02 \mu\text{F}$.
16. Draw power triangle for an RL circuit.
17. Define Tank Circuit.

SECTION – C

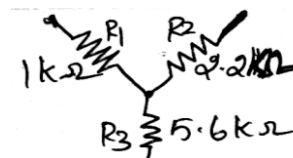
Answer ALL Questions :

(5 × 5 = 25)

18. a) Explain Norton's theorem.

(OR)

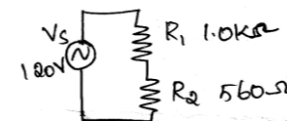
- b) Convert the wye circuit into delta circuit for given circuit.



19. a) How would you determine the various voltage and current values of a sine wave?

(OR)

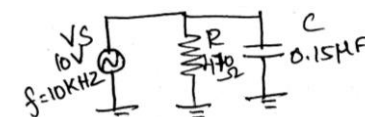
- b) Determine the rms voltage across each and the rms current for given circuit. The source voltage is given as an rms value. Also determine the total power.



20. a) Explain about RC phase shift oscillator.

(OR)

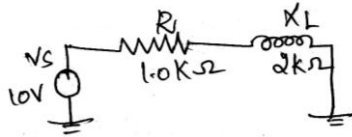
- b) Find the true power, the reactive power and apparent power for given circuit.



21. a) Analyse series RL circuit.

(OR)

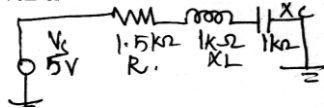
- b) Determine the power factor, true power, the reactive power and the apparent power for the given RL circuit.



22. a) Analyse the series RLC circuit.

(OR)

b) Find I, V_R, V_L & V_C at resonance for the given circuit the resonant values of X_L and X_C are shown.

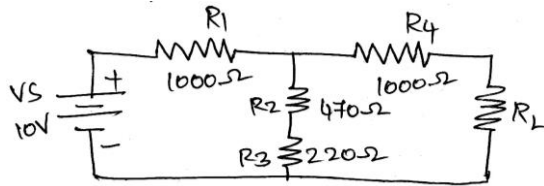


SECTION - D

Answer any THREE Questions :

(3 × 10 = 30)

23. Using Thevenin's theorem, find the thevenin's equivalent circuit between A & B for a given circuit.

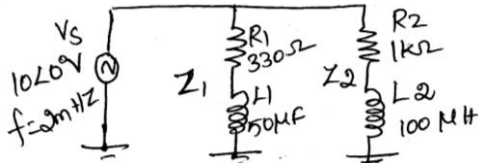


24. Discuss about oscilloscope with neat diagrams.

25. Discuss how the RC circuit operates as a filter.

26. Determine the voltage across each component for the given circuit.

Draw a current phasor diagram.



27. Analyze the operation of low pass and high pass filters.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Core Subject : Third Semester : Paper – II

SPECTROSCOPY

Under CBCS – Credit 4

Time: **3** Hours

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- Lyman series lie in the _____ region
a) visible b) ultraviolet c) infrared d) microwave
- The least energy required to excite a free neutral atom from its ground state to higher state is
a) ionization potential b) critical potential
c) excitation potential d) normal potential
- Transition of an electron between two levels with strong intensity is possible if _____
a) $\Delta L = \Delta J$ b) $\Delta L \neq \Delta J$ c) $\Delta L = -\Delta J$ d) $\Delta L = 0$
- The two outer lines are also plane polarized having vibrations in a direction perpendicular to the field is called _____
a) normal Zeeman effect b) normal longitudinal Zeeman effect
c) anomalous Zeeman effect d) normal transverse Zeeman effect
- Which among the following is ‘microwave inactive’?
a) Cl_2 b) HCl c) CH_3Cl d) all the above
- Microwave spectroscopy examines the whole molecule by virtue of its _____
a) angular momentum b) linear momentum
c) angular acceleration d) moment of inertia

7. Which among the following is a photoconductive detector used in infrared spectrometer?

- a) Indium Antimonide b) Mercury Cadmium Telluride
c) Lead Sulphide d) All the above

8. In vibration-rotation spectrum, the line at _____ will not appear.

- a) ω_0 b) $\omega_0/2$ c) $2\omega_0$ d) $\omega_0/4$

9. Which molecules have polarizability ellipsoids, with three different ellipsoidal axes?

- a) Water
c) Sulphurdioxide
- b) Hydrogen Sulphide
d) All the above

10. Raman spectroscopy is effectively observable in _____

- a) IR region b) visible or ultraviolet region
c) microwave region d) radio waves region

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. Write down the two postulates of Bohr atom model.
12. Mention the two ways of exciting an atom.
13. What is the main cause of fine structure of spectral lines?
14. Give the formula for Lande g factor.
15. List any two uses of microwave spectroscopy.
16. What are hot bands?
17. Why lasers are preferred as ideal sources in Raman spectrometers?

SECTION – C

Answer ALL Questions :

(5 × 5 = 25)

18.a) State and explain correspondence principle.

(OR)

b) Show that the velocity of the electron in the first Bohr orbit is $(1/137) c$, where c is the velocity of light.

19.a) What is the significance of spin-orbit coupling?

(OR)

b) The red line of cadmium splits into three components separated by 120MHz, when the source is placed in a magnetic field of flux density 8.6 mT, the light being examined in a direction perpendicular to the magnetic field. Calculate the ratio of charge to mass (e/m) of the electron.

20. a) Classify the molecules on the basis of their principal moments of inertia.

(OR)

b) The rotational spectrum for HCl shows series lines separated by 20.6cm^{-1} . Find the moment of inertia and the internuclear distance.

21.a) Explain the principal and working of ATR spectroscopy.

(OR)

b) Given that the spacing between the vibrational levels of CO molecule is 8.45×10^{-2} eV of energy. Find the force constant of the molecule.

22. a) Define Rayleigh scattering and Raman scattering. Explain the Raman effect on the basis of quantum theory.

(OR)

- b) The rotational Raman spectrum of H_2 gas is found to consist of a series of Stokes and anti-Stokes lines, the first of which appears at 345.9cm^{-1} relative to the source of excitation. Calculate the bond distance of H_2 .

SECTION – D

Answer any THREE Questions :

$(3 \times 10 = 30)$

23. Describe Davis and Goucher experiment to determine excitation and ionisation potentials.
24. What is Zeeman effect? Derive the expression for Zeeman shift.
25. Discuss the factors affecting the intensities of spectral lines.
26. If a diatomic molecule undergoes simple harmonic motion. Prove that vibrational energy for absorption and emission are equal.
27. Enumerate the rotational energy levels of a linear molecule and rotational Raman spectrum arising from transitions between them.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Core Subject : Fifth Semester : Paper – I

SOLID STATE PHYSICS

Under CBCS – Credit 5

Time: **3** Hours

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- Atomic packing factor of BCC structure is
a) 0.68 b) 0.74 c) 0.52 d) 1.00
- In a cubic crystal a plane makes intercepts 1, -3, 1 on the x, y and z axes respectively. The Miller indices of the plane are
a) $(\bar{3}1\bar{3})$ b) $(3\bar{1}3)$ c) $(\bar{1}31)$ d) $(\bar{1}3\bar{1})$
- A grain boundary is
a) combination of edge dislocation and screw dislocation
b) a point defect
c) the region where the crystal orientation changes gradually
d) the region where the crystal orientation changes sharply
- Edge dislocation belongs to
a) point defect b) line defect c) surface defect d) volume defect
- Dielectric loss occurs when the dielectric is subjected to
a) d.c.voltage b) a.c. voltage
c) both d.c. and a.c. voltages d) neither d.c. nor a.c. voltage
- The vibrations are quantized and these quanta are called
a) electrons b) phonons c) protons d) neutrons

7. The transition from the ferromagnetic to the paramagnetic state is named after
 a) Curie b) Curie-Weiss c) Neel d) Debye
8. The dimension of ferromagnetic domains is in the order of
 a) 10^6 m b) 10^{-9} m c) 10^{-6} m d) 10^{-3} m
9. In type-II superconductors
 a) the magnetic flux pass through the entire material
 b) the magnetic flux does not pass through the material
 c) the magnetic flux does not suddenly drop to zero but decreases exponentially
 d) none of these
10. The term SQUIDS stands for
 a) Superconducting Quantum Interference Devices
 b) Superconducting Quality Inter Devices
 c) Superconducting Quantum Interference Delivery
 d) Superconducting Quantum Intercom Devices

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. Define space lattice.
12. Describe Screw dislocation with diagram.
13. Write notes on electronic polarizability.
14. Write any three properties of diamagnetic materials.
15. What is an antiferromagnetism?
16. Write a note on Meissner effect.
17. What are Cooper pairs?

SECTION – C

Answer ALL Questions :

(5 × 5 = 25)

18. a) What are the directions in crystals?

(OR)

- b) Find the maximum radius of the interstitial sphere that can fit into the void at ($\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$) between the atoms in the body centred cubic structure.

19. a) Discuss screw dislocation with neat sketches.

(OR)

- b) A beam of X-rays is incident on a NaCl crystal with lattice spacing 0.282 nm. Calculate the wavelength of X-rays if the first order Bragg reflection takes place at a glancing angle of $8^\circ 35'$. Also calculate the maximum order of diffraction possible.

20. a) Explain Clausius-Mosotti relation in dielectrics subjected to static fields.

(OR)

- b) A dielectric material with relative permittivity $\epsilon_r = 4.94$ and $n^2 = 2.69$, calculate the ratio between the electronic and ionic polarizability for this material.

21. a) Explain the origin of magnetic moment.

(OR)

- b) A paramagnetic material has a magnetic field intensity of 10^4 A/m. If the susceptibility of the material at room temperature is 3.7×10^{-3} calculate the magnetization and flux density in the material.

22. a) Derive the expression of London penetration depth.

(OR)

b) Calculate the critical current for a wire of lead having a diameter of 1 mm at 4.2 K. The critical temperature for lead is 7.18 K and $H_0 = 6.5 \times 10^4$ A/m.

SECTION – D

Answer any THREE Questions : (3 × 10 = 30)

23. What are Miller indices? How are they obtained with suitable diagram?

24. Explain in detail the diffraction of crystals by crystal planes with neat diagram.

25. Discuss in detail Einstein's theory of specific heat.

26. Explain in detail Langevin classical theory of diamagnetism.

27. What is Josephson effect? Discuss D.C and A.C Josephson effect.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Core Subject : Fifth Semester : Paper – II

DIGITAL ELECTRONICS

Under CBCS – Credit 5

Time: **3 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

1. The number of bits in ASCII is
 a) 12 b) 10 c) 9 d) 7
2. A device which converts an active input signal into a coded output signal
 a) encoder b) decoder c) multiplexer d) demultiplexer
3. A bistable multivibrator has _____
 a) one stable state b) two stable states
 c) no stable state d) none of the above
4. The difference between half adder and full adder is
 a) Half adder has two inputs while full adder has four inputs
 b) Half adder has one output while full adder has two outputs
 c) Half adder has two inputs while full adder has three inputs
 d) All of the Mentioned
5. A register that is used to store binary information is called
 a) Data register b) Binary register
 c) Shift register d) None of the Mentioned
6. The truth table for an S-R flip-flop has how many VALID entries?
 a) 1 b) 2 c) 3 d) 4
7. In Frequency Modulation –
 a) Amplitude of the carrier remains same



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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – III : Elective Subject : Fifth Semester : Paper – I

OBJECT ORIENTED PROGRAMMING WITH C++

Under CBCS – Credit 5

Time: **3** Hours

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- The wrapping up of data and functions into a single unit is called ____
a) inheritance b) polymorphism c) encapsulation d) data hiding
- Execution of all C++ programs begins at _____ function
a) #include b) main() c) return() d) member
- The smallest individual units in a program are known as _____
a) tokens b) constants c) identifiers d) strings
- Default values for a function are specified when _____
a) function is defined b) function is declared
c) Both a and b d) None of these
- The binding of data and functions together into a single class-type variable is referred to as _____
a) encapsulation b) data hiding
c) data abstraction d) data binding
- A static member function can be called using the _____ instead of its objects.
a) variable name b) function name c) Class name d) object name
- State whether the following statements about the constructor are True or False.

i) constructors should be declared in the private section.

ii) constructors are invoked automatically when the objects are created.

a) True, True b) True, False c) False, True d) False, False

8. We can overload almost all the C++ operators except the following.

i) Class member operator (.,*) ii) Assignment operator (=)

iii) Scope resolution operator (::) iv) Conditional operator (?:)

a) i, ii and iii only b) ii, iii and iv only

c) i, iii and iv only d) All i, ii, iii and iv

9. Which among the following best describes the Inheritance?

a) Copying the code already written

b) Using the code already written once

c) Using already defined functions in programming language

d) Using the data and functions into derived segment

10. Which symbol is used to create multiple inheritance?

a) Dot b) Comma c) Dollar d) None of the mentioned

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. Define Class.

12. Write Two Applications of OOP.

13. Comment on Keywords.

14. Define Inline function.

15. What are Static data members?

16. What is Operator overloading?

17. Define Inheritance.

SECTION – C

Answer ALL Questions :

(5 × 5 = 25)

18. a) Explain about Structure of C++ program.

(OR)

b) Discuss about any Five benefits of OOP.

19. a) Explain about Basic data types with example.

(OR)

b) Discuss about Function overloading with examples.

20. a) Illustrate Static member function with example.

(OR)

b) Explain about Arrays of objects with example.

21. a) Discuss about Destructors with an example.

(OR)

b) List out any Five rules for overloading operators.

22. a) Discuss about Multilevel inheritance with suitable examples.

(OR)

b) Explain about Virtual Base classes with example.

SECTION – D

Answer any THREE Questions :

(3 × 10 = 30)

23. Write a program to find the Biggest among any three numbers.

24. Write a program to find the sum and average of given numbers using while loop.

25. Write a program to find largest among two numbers using Nesting of member function.

26. Write a program using overloading unary minus operator.

27. Write a program to multiply two numbers using multiple inheritances.

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B.A. / B.Sc. Degree (Semester) Examinations, November 2019

Part – IV : Non-Major Elective Subject : First Semester : Paper – I

SPACE SCIENCE

Under CBCS – Credit 2

Time: **2 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

1. Which is the nearest planet to the sun?
a) Neptune b) Mars c) Mercury d) Earth
2. What is the gap between the orbit of Mars and Jupiter called?
a) Asteroids b) Comets c) Meteor d) Meteorite
3. The tilting of the earth is responsible for
a) Change of days b) Change of the Sun's rays
c) Change of the season d) Day and night
4. Which of the following planets of the solar system has the longest day?
a) Jupiter b) Venus c) Mercury d) Earth
5. Decrease in strength of signal is known as
a) tuning b) modulation c) attenuation d) amplification
6. The instrument/equipment which transforms one form energy to another form of energy is called
a) transmitter b) transducer c) receiver d) modulator
7. In frequency modulation, amplitude of modulated wave is
a) positive b) negative c) zero d) constant

8. Amplitude of modulated wave is in phase with
a) output b) system c) frequency d) signal
9. Geostationary satellite has period
a) twice of Earth b) same as Earth
c) half of Earth d) quarter of Earth
10. A geosynchronous satellite
a) has the same period as that of the Earth
b) has a circular orbit
c) rotates in the equatorial plane
d) has all of the above

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. Mention the constituents of the solar system.
12. What are the outer planets in the solar system?
13. State the two basic modes of communication.
14. Enumerate the four parts of a fiber optic cable.
15. What is a payload?
16. What is an electrical transducer?
17. Mention the two basic types of electrical signal.

SECTION – C

Answer ALL Questions :

(3 × 9 = 27)

18. a) Elucidate in detail why Mars is called as “The Red planet”.
(OR)
b) Explain about Jupiter the giant.
19. a) Illustrate in detail about the formation of the Solar system.
(OR)
b) What is modulation? Explain different types of modulation.
20. a) Explain the significance of optical fibres in communication systems.
(OR)
b) Elucidate in detail how a satellite communication system works.

SECTION – D

Answer any TWO Questions :

(2 × 14 = 28)

21. Explain why Venus is called as Veiled Venus and describe the role of Green house effect on Venus.
22. Explain the essential components of communication system and various signal types and their characteristics.
23. Why modulation is necessary in communication systems?
Explain in detail about amplitude modulation.
24. Explain various stages of launching of a Satellite, different types of Satellite launch vehicles and classification of earth orbit satellites.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – IV : Skill Based Subject : Third Semester : Paper – I

SOLAR ENERGY

Under CBCS – Credit 2

Time: **2 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- The solar constant is _____.
a) 1353 W/m² b) 1535 W/m² c) 1335 W/m² d) 1533 W/m²
- The instrument is used to measure the duration in hours of bright sunshine during the course of the day is
a) Pyranometer b) Sunshine recorder
c) Eppley Pyranometer d) Yellot Solarimeter
- The radiation absorbed by the plate reduced by a factor of (1-d) where d is _____.
a) 0.02 b) 0.002 c) 0.20 d) 2.00
- Which of the following plate should have high thermal conductivity an adequate tensile strength?
a) Absorber plate b) enclosure
c) insulation d) flow passage
- In a solar collector, why is the transparent cover providing for?
a) Protect the collector from dust
b) Reduce the heat losses from collector beneath to atmosphere
c) Transmit solar radiation only
d) All of the above

6. Global radiation =
- Direct radiation – Diffuse Radiation
 - Direct radiation + Diffuse Radiation
 - Direct radiation / Diffuse Radiation
 - Diffuse Radiation / Direct radiation
7. Name the organisation has done pioneering work to promote non-renewable energy sources with its panel being displayed at a number of demonstration project sites.
- ISRO
 - CEL
 - BARC
 - SSPL
8. Silicon is the most common element on the earth and is usually obtained from
- Graphite
 - Sand
 - Rock
 - Charcoal
9. Which of the following scientist devised solar furnace composed of a paraboloidal concentrator and a lens?
- Lavoisier
 - M.K.Ghosh
 - Strauble
 - Trombe
10. Solar cells are connected and are often placed into a sealed glass or plastic unit called
- Array
 - Modules
 - phonons
 - absorber

SECTION – B

Answer any FIVE Questions : (5 × 2 = 10)

- Define Solar constant.
- List out the different solar energy measuring equipments.
- Write down the main components of flat plate collectors.
- What is focusing collector?

- Name the institutions have contributed to the development of photovoltaic technology in India.
- List out the types of solar cells.
- Mention Some applications of solar energy.

SECTION – C

Answer ALL Questions : (3 × 9 = 27)

- Explain Sunshine recorder in detail.
(OR)
b) Give a brief account on a typical liquid collector.
- Draw some possible focusing system configurations.
(OR)
b) Write down the advantages and disadvantages of Photovoltaic solar energy conversion.
- Explain the structure of the sun.
(OR)
b) Illustrate the Box type solar cooker with neat diagram.

SECTION – D

Answer any TWO Questions : (2 × 14 = 28)

- Describe briefly about Pyranometer with suitable diagram.
- Explain about the selection materials for flat plate collectors.
- Discuss briefly about the applications of solar photovoltaic system.
- Discuss briefly about solar furnace in detail.

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B.Sc. Physics Degree (Semester) Examinations, November 2019

Part – IV : Skill Based Subject : Fifth Semester : Paper – I

FIBRE OPTIC COMMUNICATION

Under CBCS – Credit 2

Time: **2 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- Refractive index is denoted by
a) λ b) v c) μ d) n
- Fractional difference between the core and cladding refractive indexes, $\Delta =$ _____.
a) $(\mu_2 - \mu_1) / \mu_1$ b) $(\mu_1 - \mu_2) / \mu_1$ c) $(\mu_1 - \mu_2) / \mu_2$ d) $(\mu_2 - \mu_1) / \mu_2$
- The velocity of light in a substance is expressed as $v_{\text{sub}} =$ _____.
a) c / λ b) λ / c c) μ / c d) c / μ
- Numerical aperture for the fibres used in short distance communications are in the range _____.
a) 0.3 to 0.4 b) 0.4 to 0.5 c) 0.5 to 0.6 d) 0.6 to 0.7
- During the CVD process, _____ is taken as base material.
a) Boron b) Polymer c) pure Silica d) Germanium
- The multi-element glasses are manufactured from very pure basic oxides and _____.
a) carbonates b) halides c) hydroxides d) bromides
- In multi-element glasses, the range of NA(Numerical Aperture) is
a) 0.2 to 0.6 b) 0.2 to 0.5 c) 0.2 to 0.8 d) 0.2 to 0.4

8. Vicor glass is

- a) 94% Silica 6% BO_3
- b) 96% Silica 4% BO_3
- c) 94% BO_3 6% Silica
- d) 96% BO_3 4% Silica

9. In Avalanche Photo Diode(APD) n^+ and p^+ are _____doped semiconductors.

- a) Lightly
- b) heavily
- c) un
- d) both a and b

10. C_D is the Photo-Diode _____.

- a) Junction capacitance
- b) Junction detector
- c) Detector Capacitance
- d) detector

SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

11. Express refractive index of the material.

12. What are the two conditions of total internal reflection in the walls of the fibre?

13. Draw the basic structure of stepped index.

14. What is the disadvantage of mono mode fibre?

15. Draw the schematic diagram of Axial Vapour Deposition.

16. Draw the diagram of reversed biased P-N Junction diode.

17. What are the two classifications of fibre optic receiver?

SECTION – C

Answer ALL Questions :

(3 × 9 = 27)

18. a) Compute the numerical aperture, acceptance angle and critical angle of the fibre having μ_1 (core refractive index) = 1.50 and the refractive index of the cladding = 1.45

(OR)

b) Calculate the refractive indices of the core and cladding material of a fibre from the following data : NA = 0.22 and Δ = 0.012

19. a) Differentiate Stepped index and Graded index.

(OR)

b) Discuss about External Chemical Vapour Deposition.

20. a) With diagram explain PIN Photo-diode.

(OR)

b) Discuss about Photo-Transistor.

SECTION – D

Answer any TWO Questions :

(2 × 14 = 28)

21. With neat diagram explain acceptance angle and acceptance cone of a optical fibre.

22. With diagrams explain Internal Chemical Vapour Deposition.

23. AlGaAs double hetero-structure light emitter along with energy band diagram and refractive index profile and explain.

24. Draw the classification table of optical transmitters and explain.



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B.A. / B.Sc. Degree (Semester) Examinations, November 2019

Part – IV : Non-Major Elective Subject : First Semester : Paper – I

ARMED FORCES AND NATIONAL INTEGRATION

Under CBCS – Credit 2

Time: 2 Hours

Max. Marks: 75

SECTION – A

Answer ALL Questions :

(10 × 1 = 10)

- The Kunzru's committee formed in the year of
a) 1947 b) 1948 c) 1950 d) 1946
- WOTA located at
a) Gwalior b) Kamptee c) Chennai d) Delhi
- Who of the following was the Chief of Army at the time of Indo-Pak war of 1971?
a) General PP Kumaramangalam b) Field Marshall SHF J Manekshaw
c) General JN Chaudhari d) General KS thimmayya
- The national games of India is
a) Hockey b) cricket c) foot ball d) kabaddi
- There are _____ bones in human body
a) 206 b) 202 c) 304 d) 218
- Indian military academy (IMA) is located at _____.
a) Dehradun b) Pune c) Mumbai d) Chennai
- The NCC day of India is _____.
a) Jan 15 b) Sep 05 c) Jun 21 d) last Sunday of November
- The study of disease is called
a) Pathology b) ecology c) virology d) fungi
- World environment day is
a) Jun 05 b) June 21 c) Aug 15 d) Jan 26
- Most polluted river in the world is
a) Yamuna b) Cavery c) Ganga d) Chenab

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SECTION – B

Answer any FIVE Questions :

(5 × 2 = 10)

- State the motto of NCC.
- Expand the terms: RDC and VSC.
- Name any two war heroes.
- What is Vijay Diwas?
- What are the types of leader?
- What is hygiene?
- What is pollution?

SECTION – C

Answer ALL Questions :

(3 × 9 = 27)

- a) What are the Cardinal points of NCC? **(OR)**
b) Draw the different ranks in army officer.
- a) What are the contributions of youth in nation building? **(OR)**
b) What are the qualities of a leader?
- a) Draw the structures of NCC organization. **(OR)**
b) What are the preventive measures for malaria?

SECTION – D

Answer any TWO Questions :

(2 × 14 = 28)

- Draw and explain the flow chart of NCC administration.
- Write an essay about the national integration.
- What is first aid? What are the items present in the first aid kit?
- Explain the air pollution and water pollution.

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