


VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
College with Potential for Excellence

 Residential & Autonomous – A Gurukula Institute of Life-Training
 Re-accredited (3rd Cycle) with 'A' Grade (CGPA 3.59 out of 4.00) by NAAC
 [Affiliated to Madurai Kamaraj University]

B.Sc. Physics Degree (Semester) Examinations, November 2022

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

MECHANICS

Under CBCS and LOCF – 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. Define inertial frame of reference.

12. In projectile motion, what happens to acceleration and velocity in the absence of resistance?

13. Express Newton's second law of motion in terms of momentum.

14. Express the relationship between torque and angular momentum.

15. Explain gauge pressure.

16. Infer Newton's third law.

17. Define time of flight.

SECTION – C

Answer ALL Questions

(5 × 5 = 25)

18. a) Obtain an equation of motion for one dimensional kinematics.

[OR]

b) A net horizontal force of 4000 N is applied to a car at rest whose weight is 10,000 N. What will the car's speed be after 8 seconds?

19. a) Derive an expression for rotational speed of a rotor necessary to prevent falling.

[OR]

b) A football is thrown with a speed of 10 m/s at an angle of 30° above the horizontal.

i) How far away should its intended receiver be?

ii) What will the time of flight be?

20. a) Explain two body collisions using momentum conservation.

[OR]

b) A 0.015 kg bullet is fired from 5 kg rifle at a muzzle velocity of 600 m/s. Find the recoil velocity of the rifle.

21. a) Define angular momentum. Derive an expression for angular momentum of a rotating rigid body.

[OR]

b) A body of mass 4.5 kg is dropped from rest at height 10.5 m above the earth's surface. Neglecting the air resistance, what will be its speed just before it strikes the ground?

22. a) Explain briefly about the working of venturimeter.

[OR]

b) The mercury column in a barometer has a measured height of 740.35 mm. The temperature is -5°C , at which temperature the density of mercury is $1.3608 \times 10^4 \text{ Kg/m}^3$. The free-fall acceleration of at the site of the barometer is 9.7835 m/s^2 . What is the atmospheric pressure?

SECTION – D

Answer any THREE Questions

(3 × 10 = 30)

23. Illustrate the significance of Newton's first, second and third laws of motion with examples.

24. Obtain an equation to calculate the period of motion of a conical pendulum.

25. Explain the centre of mass for a system of particles. Prove that in a centre of mass reference frame, the total momentum is zero.

26. Derive work-energy theorem and explain its significance.

27. State and prove Bernoulli's theorem.



Answer ALL Questions

(10 × 1 = 10)

- The path followed by a unit positive charge is _____
 - Dipole moment
 - electric dipole
 - Lines of force
 - Potential energy
- Electric field at a point on the equatorial line is
 - $2p/(4\pi\epsilon_0 r^2)$
 - $p/(4\pi\epsilon_0 r^3)$
 - $2p/(4\pi\epsilon_0 r^2)$
 - $p/(4\pi\epsilon_0 r^2)$
- The capacitor is a device for storing
 - current
 - voltage
 - magnetic field
 - charge
- The capacitance of an isolated conducting sphere of radius a is
 - $2\pi\epsilon_0 a$
 - $4\pi\epsilon_0 a$
 - $4\pi\epsilon_0 a$
 - $1/4\pi\epsilon_0 a$
- For a steady current $\nabla \cdot \mathbf{J} =$
 - 1
 - 0
 - $1/2$
 - ∞
- Basically, a potentiometer is a device for _____
 - Comparing two voltages
 - measuring current
 - Comparing two currents
 - measuring a voltage
- The current sensitivities of a moving coil ballistic galvanometer are _____
 - $\mu\text{V/mm}$
 - $\mu\text{A/mm}$
 - Wb/m^2
 - Coulombs/mm

8. The magnetic field due to electric current in a conductor is _____.

- a) in the direction of electric current
- b) in the direction opposite to electric current
- c) circular around the conductor
- d) in the centre of the conductor

9. Mean value of alternating current is

- a) $2I_0/\pi$
- b) $\sqrt{I^2}$
- c) $I_0/\sqrt{2}$
- d) I^2R

10. Transformer which converts high voltages into lower voltages are called _____

- a) Step up
- b) step down
- c) both (a) & (b)
- d) None of the above

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. Define Electric Field.

12. Show that the energy stored in a charged capacitor is $\frac{1}{2}CV^2$

13. Define Current density.

14. What are the conditions for a moving coil galvanometer to be ballistic?

15. List out any four differences between series resonant circuit and parallel resonant circuit.

16. What is called equipotential surface?

17. Show that the differential form of Ampere's law is $\text{Curl } B = \mu_0 j$

SECTION – C

Answer ALL Questions

(5 × 5 = 25)

18. a) Derive expressions for the electric field at a point on the equatorial 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 the relation between Electric Field and Electric Potential.

[OR]

b) A cable has a wire of radius 1 mm and it is surrounded by a thin metallic sheet of radius 6 mm. The space between the cable and the sheet is filled with a material of dielectric constant 2.05. What is the capacitance of 8 km length cable.

20. a) Explain the experimental method of comparing the capacitances of two capacitors with neat diagram.

[OR]

b) A copper wire of diameter 0.5mm and length 20 m 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) What is called charge sensitiveness of the ballistic galvanometer? Describe the measurement of charge sensitiveness of B.G with appropriate circuit diagram.

[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 0.2m from the centre; ii) at the centre of the coil. when a current of 0.1 A flows in it

22. a) Describe the distribution of three phase alternating current with neat diagram.

[OR]

b) An alternating voltage of 10 volts at 100 HZ is applied to a choke of inductance 5 henry and of resistance 200 ohms. Find the power factor of the coil and the power absorbed.

SECTION – D

Answer any THREE Questions

(3 × 10 = 30)

23. State and prove Gauss theorem in electrostatics.

24. a) Derive an expression for the capacitance of a parallel plate capacitor.

b) Prove that when two charged conductors share their charge, there is always a loss of energy.

25. Explain how a Carey Foster Bridge is used to determine an unknown resistance.

26. Explain in detail the principle, construction and theory of moving coil ballistic galvanometer with neat diagram.

27. An alternating emf is applied to a circuit consisting of resistance, inductance and capacitance in series. Obtain expression for the current and voltage. Also discuss about voltage magnification and Q factor.




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B.Sc. Physics Degree (Semester) Examinations, November 2022

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

PRINCIPLES OF ELECTRIC CIRCUITS

Under CBCS and LOCF – Credit 4

 Time: **3 Hours**

 Max. Marks: **75**
SECTION – A
Answer ALL Questions
(10 × 1 = 10)

- Two resistors having values 5 ohms and 10 ohms are connected in series to a 10 V source. Find the current flowing through the circuit
 a) 0.66 A b) 1.5 A c) 2 A d) 2.5 A
- A certain current source has the values $I_s = 3\mu\text{A}$ and $R_s = 1.0\text{ M}\Omega$. The value of equivalent voltage source is
 a) $3\mu\text{V}$, $1.0\text{ M}\Omega$ b) 3V , $1.0\text{ M}\Omega$ c) 1V , $3.0\text{ M}\Omega$ d) 3 mV , $3.0\text{ M}\Omega$
- A phasor represents
 a) the magnitude of the quantity
 b) the magnitude and direction of a quantity
 c) the phase angle d) the length of a quantity
- What is the correct expression of ω ?
 a) $\omega=2\pi$ b) $\omega=2\pi f$ c) $\omega=\pi f$ d) $\omega=2f^2$
- What is the phase angle for a parallel circuit consisting of a 500 kHz, 5 Vac source with a 47pF capacitor, and a 4.7 k Ω resistor in parallel?
 a) 55.3° b) 55.3° c) 34.8° d) -34.8°
- When the frequency of the source voltage decreases, the impedance of a parallel RC circuit
 a) increases b) does not increase c) decreases d) decreases to zero

7. The unit of inductive reactance X_L is
 a) ohm b) farad c) henry d) farad sec^{-1}
8. If a load is purely inductive and the reactive power is 12 VAR, the apparent power is
 a) 12 V b) 0 V c) 6 V d) 24 V
9. In a certain series resonant circuit, $V_c=150$ V, $V_L=150$ V, and $V_R=50$ V. the value of the source voltage is
 a) 150 V b) 300 V c) 50 V d) 350 V
10. For each decade increase in frequency above the critical frequency, the output of a low-pass filter decreases by
 a) 20 dB b) 3 dB c) 10 dB d) 0 dB

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

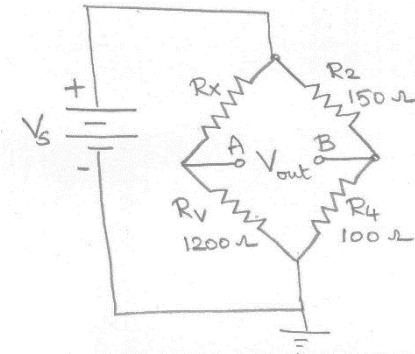
11. State Superposition theorem.
12. State 'maximum power transfer theorem'.
13. The period of a certain sine waves is 10ms. What is the frequency?
14. Define Phasors.
15. Define Conductance and Admittance.
16. Calculate the magnitude of impedance and the phase angle in RL circuit.
17. Define Series resonance.

SECTION – C

Answer ALL Questions

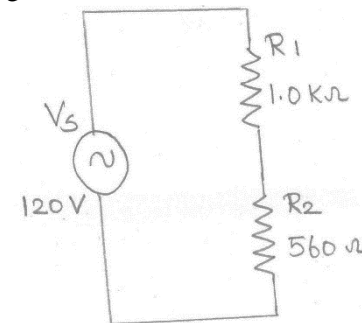
(5 × 5 = 25)

18. a) Determine the value of R_X in the balanced bridge shown in fig.



[OR]

- b) Explain Norton's theorem.
19. a) Determine the rms voltage across each resistor and the rms current in fig. The source voltage is given as a rms value. Also determine the total power.



[OR]

- b) Compare the basic operation of analog & digital oscilloscopes.
20. a) Describe the relationship between Current and Voltage in a series RC circuit.

[OR]

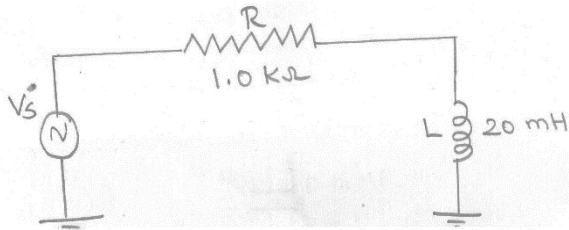
- b) Explain RC circuit as Low-Pass filter.
21. a) How to determine the impedance of a Series circuits?

[OR]

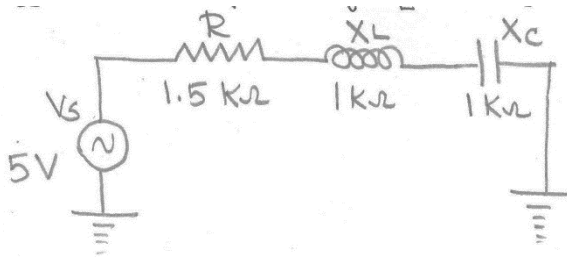
- b) For the series RL circuit in fig. determine the magnitude of the total

impedance and the phase angle for each of the following frequencies.

- a) 10 KHZ b) 20 KHZ



22. a) Find I , V_R , V_L and V_C at resonance for the circuit in fig. the resonant values of X_L and X_C are shown.



[OR]

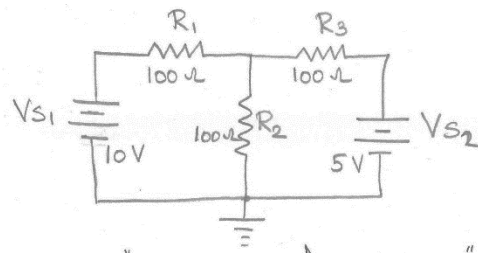
- b) Convert a series-parallel circuit to an equivalent parallel form in RLC circuit.

SECTION – D

Answer any THREE Questions

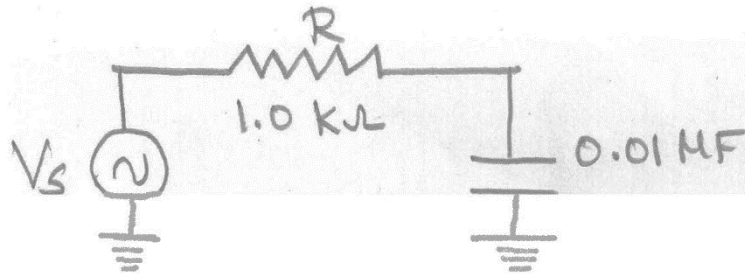
(3 × 10 = 30)

23. Using superposition theorem, find the current through the resistor R_2 .

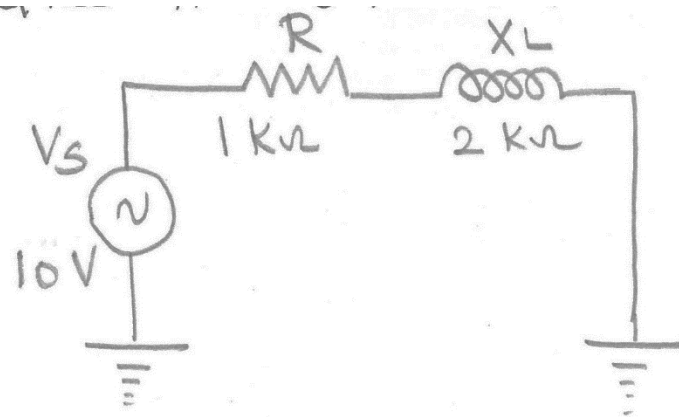


24. Discuss about “Non-Sinusoidal Wave forms”.

25. For the series RC Circuit in fig. determine the magnitude of the total impedance and the phase angle for each of the following values of input frequency. a) 10 KHZ b) 20 KHZ c) 30 KHZ



26. Determine the power factor, the true power, the reactive power and the apparent power in the circuit in fig.

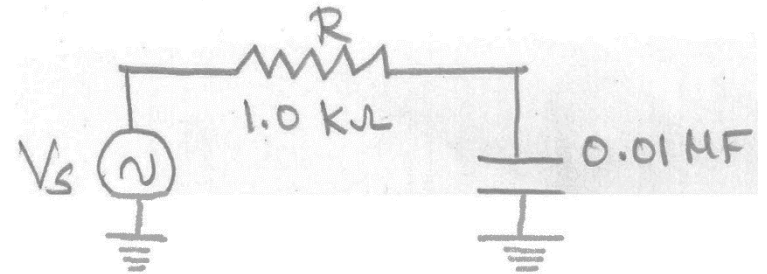


27. Analyse the operation of band pass and band stop filters.

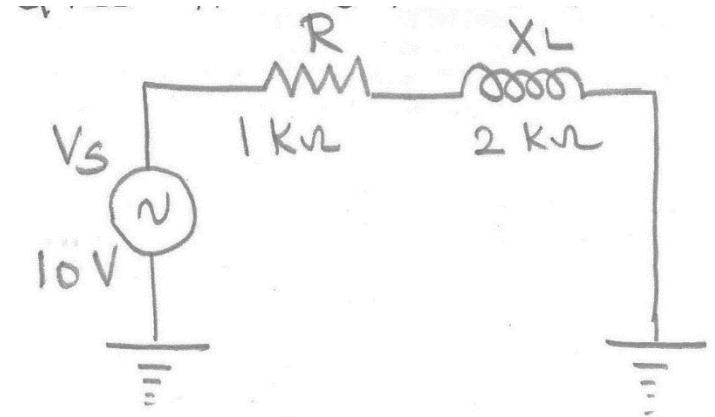


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27. Analyse the operation of band pass and band stop filters.





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B.Sc. Physics Degree (Semester) Examinations, November 2022

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

SPECTROSCOPY

Under CBCS and LOCF – Credit 4

Time: **3 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions

(10 × 1 = 10)

- Using Geiger's law, $R =$ _____
 a) a / v^2 b) av^2 c) av^3 d) a / v^3
- Wave number is the reciprocal of _____ in vacuum of a given electromagnetic radiation
 a) frequency b) time period c) wavelength d) speed
- In uniform magnetic field, the dipole experiences a torque and aligns _____ to the field
 a) parallel b) perpendicular c) 45° d) 60°
- The splitting of spectral components into more than three lines in ordinary weak magnetic fields is called _____
 a) Zeeman effect b) normal Zeeman effect
 c) anomalous Zeeman effect d) Stark effect
- Rotation of molecules about three mutually perpendicular directions through the centre of gravity occurs in _____ region.
 a) Radiofrequency b) Microwave c) Infrared d) Visible

6. Existence of two or more energy states which have exactly the same energy is called _____
 - a) kinetic energy
 - b) potential energy
 - c) degeneracy
 - d) excited potential
7. In anharmonic oscillator, zero vibrational energy is obtained at $v =$ _____
 - a) 0
 - b) 0.5
 - c) -0.5
 - d) 1
8. In an ideal harmonic oscillator spectral absorption occurs exactly at
 - a) classical vibration frequency
 - b) twice the classical vibration frequency
 - c) half the classical vibration frequency
 - d) one third of the classical vibration frequency
9. The property of a molecule to induce electric dipole moments, when a static electric field is applied is called _____
 - a) Zeeman effect
 - b) Stark effect
 - c) Polarizability
 - d) Paschen effect
10. The polarizability of a molecule in various directions is conventionally represented by drawing a _____
 - a) polarizability spheroid
 - b) polarizability ellipsoid
 - c) polarizability line
 - d) polarizability curve

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. Define ionization potential of the atom.
12. What is the significance of the correspondence principle?
13. What is the main cause of fine structure of spectral lines?
14. What is Zeeman effect?
15. Brief the working of domestic microwave oven?

16. How energy of a vibrating diatomic molecule executing SHO is expressed?
17. What are the selection rules for Raman Spectra of symmetric top molecules?

SECTION – C

Answer ALL Questions

(5 × 5 = 25)

18. a) Explain Frank and Hertz method to determine the critical potential.

[OR]

- b) Show that the velocity of the electron in the first Bohr orbit is $(\frac{1}{137}) c$, where c is the velocity light.

19. a) State and explain Larmor's theorem.

[OR]

- b) Calculate the wavelength separation between the unmodified line of wavelength 6000 \AA and the modified lines, when a magnetic induction of 1 Wbm^{-2} is applied in normal Zeeman effect.

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

[OR]

- b) Calculate the i) reduced mass and ii) moment of inertia of sodium chloride using mean internuclear distance of 2.36 Å. Atomic masses are Cl= 35x10⁻³ kgmol⁻¹. Na= 23x10⁻³ kgmol⁻¹.

21. a) Describe the components of the Spectrometer assembled for infrared work.

[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) Explain the rotational Raman spectrum of i) symmetric top molecules

ii) spherical top molecules iii) asymmetric top molecules

[OR]

b) The rotational Raman spectrum of H_2 gas is found to consist of a series of stokes and antistokes lines, the first of which appears at 3459 cm^{-1} relative to the source of excitation. Calculate the band distance of H_2

SECTION – D

Answer any THREE Questions

(3 × 10 = 30)

23. Calculate the total energy of the electron. Explain spectral series of hydrogen with energy level diagram.

24. State and explain Pauli-exclusion principle.

25. Describe the applications of Microwave spectroscopy.

26. Explain how anharmonic oscillator differs from simple harmonic oscillator. Discuss the vibrational energy levels for transition from $V=0$ to $V=1, 2$ and 3 .

27. Explain Raman effect on the basis of Classical theory.



**SECTION – A****Answer ALL Questions****(10 × 1 = 10)**

- There are _____ basic crystal systems
a) four b) five c) six d) seven
- In a crystal if the primitives $a = b = c$ and interfacial angles $\alpha = \beta = \gamma \neq 90^\circ$, then it belongs to the system
a) cubic b) tetragonal c) trigonal d) hexagonal
- Which energy in a solid result in elastic vibrations of the lattice atoms
a) thermal b) light c) chemical d) sound
- Substitutional impurity is a
a) volume defect b) surface defect
c) line defect d) point defect
- Choose the correct relation
a) $E = \epsilon_0 (\epsilon_r - 1) P$ b) $D = \epsilon_0 (\epsilon_r - 1) E$ c) $P = \epsilon_0 (\epsilon_r - 1) E$ d) $\epsilon_r = (\chi - 1)$
- Orientation polarization is due to _____ of polar molecules in dielectric substances
a) rotation b) creation of dipoles
c) charge separation d) none of these

7. Which of the following statement is wrong?
 a) Diamagnetic property is independent of temperature
 b) Paramagnetic property is dependent of temperature
 c) Paramagnetic property is independent of temperature
 d) Ferromagnetic property is dependent of temperature
8. The area of hysteresis loop of a ferromagnetic material gives
 a) the coercive force
 b) the remanent flux density
 c) the intensity of magnetisation of the material
 d) the energy that is consumed in taking the material through a cycle of magnetisation
9. The magnetisation of a superconductor is
 a) 0 b) H c) 1 d) $-H$
10. In flux quantization the value of flux quantum is
 a) 2.07×10^{-15} weber b) 2.07×10^{15} weber
 c) 7.20×10^{-15} weber d) 7.20×10^{15} weber

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. Define Space Lattice
 12. What is Point defect?
 13. Define dielectric breakdown.
 14. Give any two applications of ferrites.
 15. What is D.C. Josephson effect?
 16. What is primitive cell?
 17. Differentiate Ferromagnetic and Antiferromagnetic materials.

SECTION – C

Answer ALL Questions

(5 × 5 = 25)

18. a) What are Miller indices?
 [OR]
 b) Lattice constant of copper is 0.38 nm. Calculate the distance between (110) planes.

19. a) Differentiate Edge dislocation and Screw dislocation.

[OR]

- b) Derive the packing factor value for a crystal belonging to simple cubic system.
20. a) Prove that Ionic Polarizability “ α ” is inversely proportional to the square of the natural frequency of ionic molecule and reduced mass.

[OR]

- b) Give the properties of ferroelectric materials.
21. a) Compare Diamagnetic, Paramagnetic and ferromagnetic materials based on their properties.

[OR]

- b) In magnetic material the field strength is found to be 10^6 ampere/m. If the magnetic susceptibility of material is 0.5×10^{-5} . Calculate the intensity of magnetization and flux density in the material.

22. a) Explain:

- i) Meissener effect ii) Effect of magnetic field on Superconductors

[OR]

- b) Explain Type I & Type II Superconductors.

SECTION – D

Answer any THREE Questions

(3 × 10 = 30)

23. a) With a neat diagram explain the X-ray diffraction and Braggs law.
 b) Explain Powder X-ray diffraction.
24. Explain Surface defects.
25. Deduce Clausius Mosotti relation and explain its use predicting the dielectric constants of Solids.
26. Derive Classical Theory of Diamagnetism and also give its drawbacks.
27. Define Superconductivity. Give an account of BCS theory of Superconductivity.



Answer ALL Questions

1. Decimal number 10 is equal to binary number

- a) 1110 b) 1010 c) 1001 d) 1000

2. The inverter is _____

- a) NOT gate b) OR gate c) AND gate d) None of the above

3. A full adder can be made out of

- a) two half adders b) two half adders and a OR gate
c) two half adders and a NOT gate d) three half adders

4. The _____ is defined as the time the output is active divided by the total period of the output signal.

- a) On time b) off time c) duty cycle d) active ratio

5. A flip flop is a

- a) Combinational circuit b) memory element
c) Arithmetic element d) memory or arithmetic element

6. What type of register would have a complete binary number shifted in one bit at a time and have all the stored bits shifted out one at a time?

- a) Parallel-in Parallel-out b) Parallel-in Serial-out
c) Serial-in Parallel-out d) Serial-in Serial-out

7. In systems, pre-emphasis is used to amplify _____
 a) high frequency b) low frequency
 c) both high and low frequency d) amplitude
8. The shift in the carrier frequency from its resting point compared to the amplitude of the modulating voltage is called
 a) Deviation ratio b) modulation index
 c) modulation d) demodulation
9. How many buses are connected as part of the 8085A microprocessor?
 a) 2 b) 3 c) 5 d) 8
10. The processor status word of 8085 microprocessor has five flags namely:
 a) S, Z, AC, P, CY b) S, OV, AC, P, CY
 c) S, Z, OV, P, CY d) S, Z, AC, P, OV

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. What is multiplexer?
12. Draw the logic symbol for an exclusive – OR gate.
13. Write the four rules for binary addition.
14. What is the clock cycle time for a system that uses a 500-kHz clock?
15. Define flip flop.
16. Define amplitude modulation.
17. List the four operations performed by the MPU?

SECTION – C

Answer ALL Questions

(5 × 5 = 25)

18. a) Explain demultiplexer in detail.

[OR]

- b) i) Convert decimal 23.6 to a binary number.
 ii) Convert decimal 65535 to its hexadecimal and binary equivalents

19. a) Explain Schmitt trigger with relevant diagram.

[OR]

- b) Add these 16- bit numbers; 0000 1111 1010 1100 and 0011 1000 0111 1111. Show the corresponding hexadecimal and decimal numbers.
20. a) Describe positive edge triggered RS flip flop with logic diagram.

[OR]

- b) Find the analog output voltage from 5-bit ladder that has a digital input of 11010 and 11111. Assume that 0 = 0 V and 1 = 10V.
21. a) Interpret the mathematical representation of Amplitude modulation.
[OR]
 b) In an FM system, when the audio frequency (AF) is 500 Hz and the AF voltage is 2.4 V, the deviation is 4.8 kHz. If the AF voltage is now increased to 7.2 V, what is the new deviation? If the AF voltage is now raised to 10V while the AF is dropped to 200 Hz, What is the deviation? Find the modulation index in each case.

22. a) Explain briefly about bus structure of 8085.

[OR]

- b) Write a microprocessor program to find 2's complement of an 8-bit number.

SECTION – D

Answer any THREE Questions

(3 × 10 = 30)

23. Explain how NAND gate and NOR gate can be converted into OR, NOT and AND gates.
24. Describe the function of half adder and full adder with its logic diagram and truth table.
25. Explain synchronous 4 –bit up and down counter using JK flip flop.
26. Explain the different types of phase modulation.
27. Draw a neat block diagram of Architecture of 8085 Microprocessor.

Explain the function of each block.





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B.Sc. Physics Degree (Semester) Examinations, November 2022

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

OBJECT ORIENTED PROGRAMMING WITH C++

Under CBCS and LOCF – Credit 5

Time: **3 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions

(10 × 1 = 10)

- C is a _____ Programming language
 - Object oriented
 - Procedure oriented
 - Object based
 - Procedure based
- Procedure-oriented programming languages are _____
 - COBOL
 - FORTTRAN
 - C
 - all the above
- C++ provides various types of _____ tokens that includes keywords, identifiers, constants, strings and operators.
 - tokens
 - expressions
 - structures
 - none
- A reference variable must be initialized at the time of _____
 - initialization
 - declaration
 - running
 - definition
- In C++, the declaration of functions and variables are collectively called _____
 - class members
 - function members
 - object members
 - member variables

6. State whether the following statements are True or False about the characteristics of static data members.

- i) Only one copy of static member is created for the entire class and is shared by all the objects of that class, no matter how many objects are created.
- ii) Static member variable is visible only within the class, but its lifetime is the entire program.

- a) i-True, ii-True b) i-False, ii-True
c) i-True, ii-False d) i-True, ii-True

7. C++ provides a special _____ called the constructor, which enables an object to initialize itself when it is created.

- a) friend function b) member function
c) public function d) private function

8. Destructor is a member function whose name is same as the class name but is preceded by a _____

- a) tilde b) hash c) dot d) dollar

9. What does inheritance allows you to do?

- a) create a class b) create a hierarchy of classes
c) access methods d) None of the mentioned

10. If a base class is inherited in protected access mode, then which among the following is true?

- a) Public and Protected members of base class becomes protected members of derived class
b) Only protected members become protected members of derived class
c) Private, Protected and Public all members of base, become private of derived class
d) Only private members of base, become private of derived class

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. Define the term encapsulation.
12. Comment on Object.
13. List the derived data types used in C++.
14. Define function overloading.
15. State two properties of static member function.
16. Mention the use of copy constructor.
17. Highlight the advantages of virtual base class.

SECTION – C

Answer ALL Questions

(5 × 5 = 25)

18. a) Describe the structure of C++ program.

[OR]

b) Recapitulate dynamic binding and message passing.

19. a) Elucidate inline function with example.

[OR]

b) Classify basic data types in C++ with examples.

20. a) Explain friend function with example.

[OR]

b) How is the member function of a class defined?

21. a) Explicate constructors with its characteristics.

[OR]

b) List out any five rules for overloading operators.

22. a) Demonstrate the functioning of hybrid inheritance.

[OR]

b) Outline about multilevel inheritance.

SECTION – D

Answer any THREE Questions

(3 × 10 = 30)

23. Write a program for temperature conversion (Celsius to Fahrenheit and Fahrenheit to Celsius) using if-else statement.

24. Write a program to find the factorial of the given number using Recursive function.

25. Write a program to read a set of numbers from the standard input device and to sort them in ascending order.

26. Write a program to solve quadric equation using OOP technique.

27. Write a program to implement single inheritance.





B.A. & B.Sc. Degree (Semester) Examinations, November 2022

Part – IV: Generic Elective Course: First Semester: Paper – I

SPACE SCIENCE

Under CBCS and LOCF – Credit 2

Time: **2 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions

(10 × 1 = 10)

1. The present director of ISRO is
 - a) Dr. Vikram Sarabhai
 - b) Dr. Kirankumar
 - c) Dr. Radhakrishnan
 - d) Dr. Somanath
2. How many planets in our solar system
 - a) nine
 - b) five
 - c) eight
 - d) four
3. Which one is the biggest planet in our solar system
 - a) Mars
 - b) Jupiter
 - c) Saturn
 - d) Neptune
4. The normal human body temperature is
 - a) 36.9 degree Celsius
 - b) 40.9-degree Celsius
 - c) 30.9 degree Celsius
 - d) 35.9 degree Celsius
5. The term FM stands for
 - a) Frequency Main
 - b) Frequency Modulation
 - c) Faith Modulation
 - d) Frequency Multiple
6. Optical stands for
 - a) sound
 - b) frequency
 - c) light
 - d) velocity

7. Modulation means

- a) Change b) negative c) frequency d) velocity

8. The term OFC stands for

- a) Optical Fiber Cable b) Original Fiber Cable
c) Only Flexible Cable d) Optical Flexible Cable

9. A body moving in an orbit around a planet is known as

- a) missile b) rocket c) satellite d) comet

10. The Head Quarters of ISRO is located at

- a) Chennai b) Bangaluru c) Delhi d) Calcutta

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. What do mean by heliocentric theory?

12. Write down the constituents of solar systems?

13. Give any two points about the Neptune planet

14. Write a short note on Pluto

15. What is OFC?

16. What do you mean by modulation?

17. Write any two points about ISRO

SECTION – C

Answer ALL Questions

(3 × 9 = 27)

18. a) Explain in detail about the Solar system.

[OR]

b) Give a brief account of Moon - the closest neighbour.

19. a) Give the theory of Scorched Mercury

[OR]

b) Explain Information, Transmitter and Channel

20. a) Explain the AM, FM and Phase modulation

[OR]

b) Give a note on the Multistage Rocket

SECTION – D

Answer any TWO Questions

(2 × 14 = 28)

21. Briefly explain the Venus and Mars planets

22. Discuss in detail about the Saturn and its rocky rings

23. Write down the various benefits of optical fiber communication system

24. Describe in detail about the Geo stationary satellite

RRRRR

**SECTION – A****Answer ALL Questions****(10 × 1 = 10)**

- The light propagation in an optical fibre will effectively happen only when
 - refractive index of core is greater than cladding
 - refractive index of core is less than cladding
 - refractive index of both core and cladding are equal
 - all of the above
- The working principle of an optical fibre is

a) reflection	b) refraction
c) total internal reflection	d) polarization
- In an optical fiber, the concept of numerical aperture is applicable in describing the ability of

a) light collection	b) light scattering
c) light dispersion	d) light polarization
- The chief characteristics of a stepped index monomode fibre is

a) very small core diameter	b) low NA
c) very high bandwidth	d) all of the above

5. In the fabrication of optical fibre silica is used because

- a) it is cheap and easily available b) it is obtained in abundance
- c) it is obtained in purest form d) processing it is easier

6. The optimal NA achieved using PHASIL system is

- a) 0.1 b) 0.3 c) 0.2 d) 0.4

7. Source of light in optical fibre is

- a) PIN diode b) Photo diode c) phototransistor d) LED

8. Which of following is more sensitive?

- a) PIN diode b) APD c) neither a) nor b) d) both a) and b)

9. Bandwidth of phototransistor is about

- a) 4 MHz b) 400 MHz c) 400 kHz d) 40 kHz

10. Function of receiver in optical fibre is to

- a) reshape the degraded signal only
- b) only amplify the degraded signal
- c) both amplify and reshape the degraded signal
- d) retrieve the signal

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. State the two conditions for total internal reflection.
12. Enumerate the three broad classes of optical fibres.
13. Why plastic fibres are not available for use at long wavelength?
14. Mention the different types of optical fibre fabrication processes.
15. What are the advantages of multi-element glasses?
16. Draw the equivalent circuit of a PIN photo-diode.
17. Enlist the two different classes of optical fibre transmitters.

SECTION – C

Answer ALL Questions

(3 × 9 = 27)

18. a) i) Compute the NA, acceptance angle, and the critical angle of the fibre having core refractive index 1.50 and clad refractive index 1.45.
ii) Calculate the refractive indices of the core and cladding material of a fibre from the following data: NA = 0.22 and $\Delta = 0.012$.

[OR]

- b) Explain the working principle of a stepped index fibre.

19. a) Explain the external chemical vapour deposition process.

[OR]

- b) Explain the working principle of a DHLED along with energy band diagram and refractive index profile.

20. a) i) A graded index fibre has a core diameter of 50 μm . NA = 0.21 and index profile = 1.85. Compute the number of modes at operating wavelength of 1.3 μm .
ii) Calculate the efficiency of a PIN silicon photo-detector if the responsivity is 0.58 A/W at 850 nm.

[OR]

- b) Explain various important applications of integrated optic fibre technology.

SECTION – D

Answer any TWO Questions

(2 × 14 = 28)

21. Derive the expression for the acceptance angle and numerical aperture of an optical fibre.
22. Explain various internal CVD techniques along with their characteristics.
23. Elucidate the working principle of PN junction photo detector and Avalanche photo-diode.
24. Explain with necessary circuit diagrams, the working principle of various fibre optic receivers.

RRRRR

**SECTION – A****Answer ALL Questions****(10 × 1 = 10)**

- The instrument is used to measure the duration in hours of bright sunshine during the course of the day is
 - Pyranometer
 - Sunshine recorder
 - Eppley Pyranometer
 - Yellot Solarimeter
- The upper layer of the convective zone is called _____
 - Chromospheres
 - Photosphere
 - Convective layer
 - corona
- The radiation absorbed by the plate reduced by a factor of (1-d) where d is _____
 - 0.02
 - 0.002
 - 0.20
 - 2.00
- Which of the following plate should have high thermal conductivity and adequate tensile strength
 - Absorber plate
 - enclosure
 - insulation
 - flow passage
- In India, a simple instrument is often used for quick measurement of the total solar radiation is
 - Agni
 - Suryamapi
 - Suryalight
 - Suryavista

6. Solar cells are connected and are often placed into a sealed glass or plastic unit called

- a) Array b) Modules c) phonons d) absorber

7. Global radiation =

- a) Direct radiation – Diffuse Radiation
b) Direct radiation + Diffuse Radiation
c) Direct radiation / Diffuse Radiation
d) Diffuse Radiation / Direct radiation

8. 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.

9. Silicon is the most common element on the earth and is usually obtained from

- a) Graphite b) Sand c) Rock d) Charcoal

10. Which of the following scientist devised solar furnace composed of a paraboloidal concentrator and a lens?

- a) Lavoisier b) M.K.Ghosh c) Straubel d) Trombe

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. Define Solar Constant.
12. What is solar collector?
13. List out the different solar energy measuring equipment's.
14. What is focusing collector?
15. Give a note on the application of solar energy in space.
16. What is solar cell?
17. Name the institutions have contributed to the development of photovoltaic technology in India.

SECTION – C

Answer ALL Questions

(3 × 9 = 27)

18. a) Explain about sunshine recorder in detail.

[OR]

b) Explain the structure of the sun.

19. a) Write about the main advantages and disadvantages of concentrator systems over flat plate collector.

[OR]

b) What are the main components used in the flat plate collector and explain the effect of dust and shading.

20. a) Discuss briefly about solar furnace in detail.

[OR]

b) Write down the advantages and disadvantages of Photovoltaic solar energy conversion.

SECTION – D

Answer any TWO Questions

(2 × 14 = 28)

21. Discuss briefly about pyranometer the most common instrument used for the measurement of global radiation
22. Explain about the selection materials for flat plate collectors
23. Illustrate the Box type solar cooker with neat diagram and also mention its merits and demerits.
24. Discuss briefly about the applications of solar photovoltaic system.

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B.A., B.Sc., B.Com. & B.Com.(CA) Degree (Semester) Examinations, November 2022

HOUSE WIRING-I

CERTIFICATE COURSES

Time: 2 Hours

Max. Marks: 50

SECTION – A

Answer ALL Questions

(10 × 1 = 10)

1. What is A.C?
2. What is D.C?
3. What is Multimeter?
4. What is the composition of fuse wire?
5. Expand the term LED.
6. What is MCB?
7. List out the colours used in three phase supply?
8. What is the domestic supply voltage?
9. What is the function of a tester?
10. What is meant by changeover switch?

SECTION – B

Answer ALL Questions

(4 × 5 = 20)

- 11.a) Discuss briefly about the precautions to be taken to prevent electric shock.

[OR]

- b) Explain about Earthing connection to the domestic appliances.

- 12.a) Draw the symbols for: i) Cell ii) Battery iii) Earth iv) Transformer v) LED

[OR]

- b) Explain about the functions of transformer.

- 13.a) Describe the function of MCB in main board.

[OR]

- b) Determine the function of Fan regulator step and non step type.

- 14.a) Examine the function of soldering rod.

[OR]

- b) Explain about the remedial measures to be taken during electric-related injury.

SECTION – C

Answer any TWO Questions

(2 × 10 = 20)

15. Explain how to connect the wires in switch board
16. List out the tools used for electrical works in our daily life.
17. Give a brief account on UPS and Battery functions

BBBBB



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B.A. & B.Sc. Degree (Semester) Examinations, November 2022

Part – IV: Generic Elective Course: First Semester: Paper – I

ARMED FORCES AND NATIONAL INTEGRATION

Under CBCS and LOCF – Credit 2

Time: **2 Hours**

Max. Marks: **75**

SECTION – A

Answer ALL Questions

(10 × 1 = 10)

1. The Kunzru's committee formed in the year of
a) 1947 b) 1948 c) 1950 d) 1946
2. OTA located at
a) Gwalior b) Kamptee c) Chennai d) Delhi
3. 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
4. The national games of India are
a) Hockey b) cricket c) football d) kabaddi
5. There are _____ bones in human body.
a) 206 b) 202 c) 304 d) 218
6. Indian military academy (IMA) is located at_____
a) Dehradun b) Pune c) Mumbai d) Chennai
7. The NCC day of India is_____
a) Jan 15 b) Sep 05
c) Jun 21 d) last Sunday of November

8. The study of disease is called

- a) Pathology b) ecology c) virology d) fungi

9. World environment day is

- a) Jun 05 b) June 21 c) Aug 15 d) Jan 26

10. Most polluted river in the world is

- a) Yamuna b) Cavery c) Ganga d) Chenab

SECTION – B

Answer any FIVE Questions

(5 × 2 = 10)

11. State the motto of NCC.

12. Expand the terms: TSC and RDC.

13. Write the name of any two war heroes.

14. What are Vijay Diwas?

15. What are the types of leaders?

16. What is hygiene?

17. Define the term pollution.

SECTION – C

Answer ALL Questions

(3 × 9 = 27)

18. a) What are the Cardinal points of NCC?

[OR]

b) Draw the different ranks in army officer.

19. a) What are the contributions of youth in nation building?

[OR]

b) What are the qualities of a leader?

20. 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)

21. Draw and explain the flow chart of NCC administration.

22. Write an essay about the national integration.

23. What is first aid? What are the items present in the first aid kit?

24. Explain the air pollution and water pollution.

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