VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]
B.Sc. Maths/Chemistry Degree (Semester) Examinations, November 2017
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)**

1. The persistence of sound for some time even after the source has stopped is called _____.
   a) reverberation   b) absorption   c) reflection   d) refraction

2. _____ is the property of liquids owing to which they tend to acquire minimum surface area.
   a) viscosity   b) surface tension c) elasticity   d) entropy

3. The entropy change during a reversible adiabatic process is _____
   a) positive   b) negative   c) zero   d) infinity

4. The relay is _____ operated switch.
   electrically   b) magnetically   c) optically   d) mechanically

5. The condition for minimum spherical aberration for two lenses separated by a distance 'a' is equal to _____
   a) f_1f_2 b) f_1+f_2 c) f_1-f_2 d) f_1/f_2

6. In simple harmonic motion the acceleration is directly proportional to _____ and directed towards a fixed point.

7. The energy stored in the wire is equal to the _____in stretching it.

8. It is impossible to construct a refrigerator that works without the supply of _____

9. Two types of fuses are _____ fuse and _____ fuse.

10. The defect of colored image formed by a lens with white light is called _____ aberration.

SECTION – B

<u>Answer ALL Questions :</u>   (5 × 7 = 35)

11. a) Give the uses of ultrasonic waves.

(OR)

   b) The volume of a room is 600 m^3. The wall area of the room is 220 m^2, the floor area is 120 m^2 and ceiling area is 120m^2. The average sound absorption coefficient i) for the wall is 0.03 ii) for the floor is 0.06 and iii) for the ceiling is 0.80. Calculate the average sound absorption coefficient and the reverberation time.

12. a) Derive an expression for bending moment.

(OR)

   b) In a Jaegar 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 1100kg/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.

13. a) State and explain second law of thermodynamics.

(OR)

   b) A Carnot's engine working as a refrigerator between 260 K and 300 K receives 2100J of heat from the reservoir at a lower temperature. Calculate the amount of heat rejected to the reservoir at a higher temperature. Calculate also the amount of work done in each cycle to operate the refrigerator.

14. a) What is a switch? Explain the various types of switch.

(OR)

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

15. a) Explain a direct vision spectroscope.

(OR)

   b) Two glasses have dispersive powers in the ratio 2:3. These glasses are to be used in the manufacture of an achromatic objective of focal length 20 cm. what are the focal lengths of the lenses?

SECTION – C

<u>Answer any THREE Questions :</u>   (3 × 10 = 30)

16. Describe Melde's string method to determine the frequency of an electrically maintained tuning fork by transverse and longitudinal modes.

17. State and explain Poiseuille's formula for the flow of liquid through a horizontal capillary tube.

18. Explain the change of entropy in a reversible process.

19. Derive an expression for the field along the axis of a circular coil carrying current.

20. Explain what is meant by spherical aberration for a lens. How it caused and what are the ways for its minimization?

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B.Sc. Physics Degree (Semester) Examinations, November 2017
Part – III : Core Subject : First Semester : Paper – I

MECHANICS
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions: $(10 \times 1 = 10)$

1. When the car is at rest or moving with constant velocity, its acceleration is

   a) Zero   b)constant   c) positive   d) negative

2. The trajectory of the projectile is

   a) parabola   b) straight line   c) Hyperbola   d) elliptical

3. Conservation laws hold good for

   a) energy   b) momentum

   c) electric charge   d) all the above

4. The rate at which work is done is called

   a) force   b) displacement   c) power   d) none

5. The ratio of mass to volume of the object is called

   a) pressure   b) density   c)force   d) energy

6. Newton's first law is called _____.

7. The forces acting between surfaces in relative motion are called_____.

8. Change in momentum is called the_____.

9. Change in Kinetic energy is called_____.

10. Atmospheric pressure is measured using_____.

SECTION – B

Answer ALL Questions: $(5 \times 7 = 35)$

11. a) Write the equations of one dimensional kinematics.
    (OR)
    b) A 12.0g bullet is accelerated from rest to a speed of 700m/s as it travel 20cm in a gun barrel. Assuming the acceleration to be constant, how large was the accelerating force?

12. a) Discuss about uniform circular motion
    (OR)
    b) A 400 kg block originally moving at 120cm/s coats 70cm along a table top before coming to stop. What is the coefficient of friction between block and table?

13. a) Describe and explain linear momentum.
    (OR)
    b) A 1088.64 kg car strikes a fence at 9.144m/s and comes to a stop in 1s. What average force acted on the car?

14. a) Prove Work- Energy theorem using Newton's law.
    (OR)
    b) A body of mass m=4.5g is dropped from rest at a height h=10.5m above the earth surface. Neglecting air resistance, what will its speed be just before it strikes the ground?

15. a) Calculate the static and dynamic pressure using Bernoulli's theorem.   **(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 1.03×10^3 kg/m^3)

SECTION – C

Answer any THREE Questions: $(3 \times 10 = 30)$

16. Write the equations of motion when the particle moves with constant acceleration.
17. Arrive at the equation to calculate the period of motion of conical pendulum.
18. Deduce Newton's second law in the case of many particle systems.
19. What is the relation between angular momentum and angular velocity? When will they point in the same direction?
20. Derive the equation of continuity for the steady flow of the fluid.
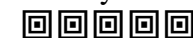
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B.Sc. Physics Degree (Semester) Examinations, November 2017
Part – III : Core Subject : First Semester : Paper – II

ELECTROMAGNETISM
Under CBCS – Credit 4
Time: **3** Hours   Max. Marks: **75**

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

1. _____ at a point is defined as the force that acts on a unit positive charge placed at that point.
   a) electric field   b) electric force
   c) magnetic field   d) magnetic force

2. The capacitance of the parallel plate capacitor is _____.
   a) $\dfrac{\varepsilon_0 A}{d}$ b) $\dfrac{\varepsilon_0 A}{q}$ c) $\dfrac{\varepsilon_0 \varepsilon_r}{d}$ d) $\dfrac{\varepsilon_0 \varepsilon_r}{q}$

3. _____ is defined as the net charge flowing across the area per unit time.
   a) charge   b) flux   c) current   d) density

4. The equation for Lorentz force _____.
   a) F = q(E+VxB)   b) F = q(E+LxB)
   c) F = q(L+VxB)   d) F = q(E+vxB)

5. There is loss of power due to Joule heating in the primary and secondary windings
   a) copper loss   b) iron loss
   c) hysteresis loss   d) leakage of magnetic flux

6. The SI unit of charge is the _____.

7. Potential is a _____ quantity.

8. The unit of current density is _____.

9. The Biot – Savart law is dB = _____.

10. _____ = apparent power x power factor

SECTION – B
Answer ALL Questions: **(5 × 7 = 35)**

11. a) Explain in detail about electric field due to a uniformly charged sphere.   **(OR)**
    b) Calculate the electric field at a distance y from an infinite line charge having linear density of charge λ.

12. a) Describe the capacitance of a cylindrical capacitor with example.
                      (OR)
    b) An isolated metal sphere whose diameter is 10 cm has a potential difference of 8000 volts. What is the energy density at the surface of the sphere?

13. a) Describe how will you use potentiometer to calibrate an ammeter and a voltmeter?   **(OR)**
    b) A copper wire of diameter 0.5 mm and length 20 m is connected across a battery of emf 1.5V and internal resistance $1.25\,\Omega$. 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?

14. a) Derive an expression for magnetic induction at a point on the axis of a circular coil carrying current. **(OR)**
    b) A long solenoid of length 1 m and mean diameter 0.1m consists of 1000 turns of wire. A current of 20 A flows through it. Calculate the magnetic induction on its axis (i) at its centre, (ii) at one of its ends.

15. a) Obtain an expression for power in ac circuit containing resistance, inductance and capacitance. **(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 – C
Answer any THREE Questions: **(3 × 10 = 30)**

16. Derive an expression for the electric field at a point on the
    a) axial line   b) equatorial line   c) due to an electric dipole.

17. Explain the various types of capacitors with diagram.

18. Give the 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.

19. Describe the construction and working of moving coil Ballistic galvanometer.

20. Describe the construction and action of a D.C. dynamo.

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B.Sc. Physics Degree (Semester) Examinations, November 2017
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)**

1. An ideal voltage source would have
   a) large value of emf   b) small value of emf
   c) zero internal resistance   d) infinite source resistance

2. The angular velocity of a phasor representing a sine wave with a frequency of 1500Hz is
   a) 100 KHz   b) 9.42 KHz   c) 150 KHz   d) 15 KHz

3. The phase angle between the capacitor current and the applied voltage in a parallel RC circuit is
   a) 180° b) 90° c) 360° d) 45°

4. The time constant of a series RL circuit with R=1.5 $K\Omega$ and L=5 mH is
   a) 1.5 μs b) 3.33 μs c) 5 μs d) 7..5 μs

5. A _____ filter allows signals with higher frequencies to pass from input to output while rejecting lower frequencies.
   a) low pass   b) high pass   c) band pass   d) band stop

6. Ground has a potential of _____ V with respect to all other points in an electronic circuit.

7. The repetition rate of the wave form is known as _____

8. Filters are _____ circuits.

9. Susceptance is the reciprocal of _____.

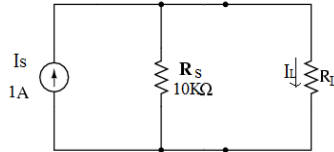10. For a low pass RC filter, the output is _____ % of the input when Xc = R.

SECTION – B

11. a) State thevenin's theorem? How will you find out the two components of a Thevenin equivalent circuit.

(OR)

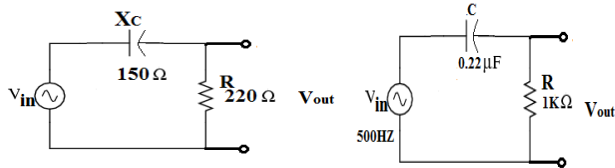b) Calculate the load current in the circuit for the values of R_L; $100\,\Omega$, $500\,\Omega$ and $1\,K\Omega$

12. a) Define the following parameters   i) rise time   ii) fall time   iii) pulse width   **(OR)**

b) Subtract   i) 1+j2 from 3+j4
                   ii) 10-j8 from 15=j5
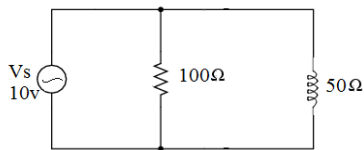
13. a) Discuss about power in ac circuits.

(OR)

b) Calculate the output phase angle for the following circuits.

14. a) Obtain the relation between current and voltages in a series RL circuit and explain how impedance and phase angle vary with frequency.
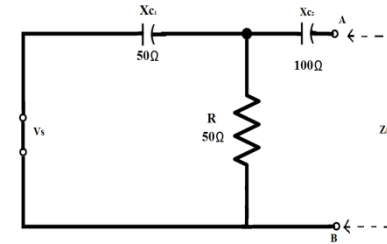
(OR)

b) Determine the magnitude of the total impedance and phase angle for the circuit.

15. a) Derive the expression for Millman's equivalent voltage and equivalent impedance.

(OR)

b) Find Zn for the given circuit viewed from the open terminals AB.

SECTION – C

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

16. Write the conversion formula and rules to convert from Δ-Y to Y- Δ network.

17. Convert the following complex numbers from rectangular form to polar form.

    a) 8+j6   b)10-j5   c)12-j18

18. Analyze the series RC circuit.

19. Determine the power factor, the average power, the reactive power and the apparent power.
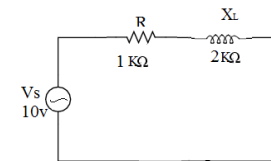
20. Write a note on Band pass and Band stop filters.

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B.Sc. Physics Degree (Semester) Examinations, November 2017

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

SPECTROSCOPY

Under CBCS – Credit 5

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions: (10 × 1 = 10)

1. Lyman series lie in the _____ region.
   a) visible   b) ultraviolet   c) infrared   d) microwave

2. The ratio of magnetic dipole moment to angular momentum is called _____.
   a) gyrometric ratio   b) Bohr magneton
   c) Lande's splitting factor   d) None of the above

3. The equation of energy of a rotator E is _____.
   a) $I\omega^2$ b) $I\omega$ c) $1/2\, I\omega^2$ d) $2\, I\omega$

4. In an atomic oscillator, zero vibrational energy is obtained at V=__.
   a) 0   b) 0.5   c) -0.5   d) 1

5. The property of a molecule to induce electric dipole moments, when a static electric field applied is called _____.
   a) Zeeman effect   b) Stark effect
   c) Polarizability   d) None of the above

6. Reciprocal of a wavelength in vacuum of radiation is _____.

7. Unit of energy used to express the splitting of the energy levels in a magnetic field is _____.

8. Microwave rotational spectrum can be observed in _____molecule.

9. Selection rule for Hormonic oscillator is _____.

10. Raman spectroscopy is effectively observed in _____.

SECTION – B

Answer ALL Questions: (5 × 7 = 35)

11. a) List out the concepts which favour Bohr's theory.   **(OR)**
    b) How many revolutions does an electron in the n=2 state of a hydrogen atom make before dropping to n=1 state?

12. a) State and explain Larmor's theorem.   **(OR)**
    b) Calculate the wavelength separation between the two component lines which are observed in the normal Zeeman effect. The magnetic field used is 0.4weber/m2: the specific charge = 1.76×10^{11} Ckg^{-1} and λ = 6000 A.U.

13. a) Classify the molecules on the basis of their principle moment of inertia.   **(OR)**
    b) The pure rotational (microwave) spectrum of HCl consists of a series of equally spaced lines separated by 20.80 cm^{-1}. Calculate the inter nuclear distance of the molecule. The atomic masses are ^{1}H =1.673×10^{-27}kg and ^{25}Cl = 58.06×10^{-27}kg.

14. a) Describe how the double beam operation reduces the effects of interference in a spectrometer.   **(OR)**
    b) The force constant of CO is 1840 Nm^{-1}. Calculate oscillation frequency and wave number in cm^{-1}. Given that reduced mass of CO = 1.14×10^{-26}Kg: h=6.6×10^{-34}Js: 1eV = 1.6×10^{-19}J.

15. a) Define Rayleigh scattering and Raman scattering. Explain the Raman effect on the basis of quantum theory.   **(OR)**
    b) The exciting line in an experiment is 5460 A.U. and the stokes line is at 5520 A.U. Find the wavelength of antistokes line?

SECTION – C

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

16. Explain Davis and Goucher experiment to determine excitation and ionization potentials.
17. Explain the Stern and Gerlach experiment.
18. Calculate the allowed rotational energies of a rigid diatomic molecule.
19. Explain how a harmonic oscillator differs from simple harmonic oscillator. Discuss the vibrational energy levels for transition from v = 0 to v = 1, 2 and 3.
20. Explain the rotational energy level of a linear molecule and the rotational Raman spectrum arising from transitions between them.

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B.Sc. Physics Degree (Semester) Examinations, November 2017
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)

1. Miller Indices of the diagonal plane of a cube are
   a) 110   b) 100   c) 111   d) 011

2. According to Bragg's law _____
   a) $n \lambda = d \sin \theta$ b) $\lambda = d \sin 2\theta$
   c) $n \lambda = 2d \sin \theta$ d) $n \lambda = 2d \sin 2\theta$

3. Condition under which spontaneous polarization in a dielectric occurs is
   a) $N \alpha \gamma^2 / \varepsilon_0 = 1$ b) $N \alpha^2 \gamma / \varepsilon_0 = 1$ c) $N^2 \alpha \gamma / \varepsilon_0 = 1$ d) $N \alpha \gamma / \varepsilon_0 = 1$

4. Above the Curie temperature, a magnetic material becomes
   a) ferromagnetic   b) paramagnetic
   c) diamagnetic   d) None of the above

5. A superconducting material when placed in a magnetic field will
   a) attract the magnetic field towards its centre
   b) attract the magnetic field but transfer it in to a concentrated zone
   c) repel all the magnetic lines of force passing through it
   d) not influence the magnetic field.

6. A _____ can be defined as a three dimensional array of points, each of which has identical surroundings.

7. Dislocations are _____ defect.

8. Dielectric materials are used primarily for _____.

9. The magnetic susceptibility of the material is the ratio of _____ and _____.

10. The complete expulsion of all magnetic fields from the interior of the superconductor is called _____.

SECTION – B

Answer ALL Questions :   (5 × 7 = 35)

11. a) What are three symmetry elements that characterize the seven crystal systems? Explain.   **(OR)**
    b) Copper has FCC structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (110) and (212).

12. a) What are crystal imperfections? Explain.   **(OR)**
    b) The fraction of vacancy site in metal is 1×10^{-10} at $500° C$. What will be the fraction of vacancy sites at $1000° C$

13. a) Give a brief account on Einstein's theory of specific heat of solids.   **(OR)**
    b) The parallel plate capacitor has an area of $100 cm^2$, a plate separation of 1 cm and is charged to a potential of 100V. Calculate the capacitance of the capacitor and charge on the plate.

14. a) Explain in detail about domain theory of Ferromagnetism. Also explain the hysteresis curve on the basis of Domain. **(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.

15. a) What is superconductivity? Write a note an BCS theory of superconductivity.   **(OR)**
    b) The superconducting transition temperature of lead is 7.26K. The initial field at 0K is 64×10^3 ampere/m. Calculate the critical field at 5K.

SECTION – C

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

16. Explain how different stacking sequences result in different crystal structures.

17. Name two types of line imperfections. Explain them with the help of Burger's vector. Also explain about the surface imperfection and twin boundary.

18. Discuss the various polarization processes in dielectric materials.

19. Discuss in detail, Langevin's theory of a paramagnetism. Obtain an expression for susceptibility.

20. Explain what are called Meissner effect and Josephsons effect. Also explain Type I and Type II superconductors.

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B.Sc. Physics Degree (Semester) Examinations, November 2017
Part – III : Core Subject : Fifth Semester : Paper – II
ELECTRONICS & COMMUNICATION - II
Under CBCS – Credit 5
Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. _____ gate is also known as inverter

   a) NOR   b) NOT   c) AND   d) OR

2. In half adder the sum output is same as that of

   a) Inverter   b) NAND gate   c) AND gate   d) EX – OR gate

3. When J=K=1 the flip-flop output is

   a) no change   b) reset   c) set   d) toggles

4. Which of the following pulse modulation system is analog?

   a) PCM   b) Delta   c) PAM   d) All the above

5. In 8085 microprocessor, the length of the instruction register is _____.

   a) 9   b) 16   c) 8   d) 12

6. BCD stands for _____.

7. The stable output state of a 555 timer in _____ mode is low.

8. _____flip-flops are required to construct a mod – 128 counter.

9. The amplitude of the _____ modulated wave remains

   constant at all times.

10. The largest number that appears on the data bus is _____.

SECTION – B

Answer ALL Questions :   **(5 × 7 = 35)**

11. a) Explain about BCD to decimal decoders.

    (**OR**)

    b) Convert decimal 65,535 to its binary and hexadecimal
       equivalents.

12. a) Discuss the function of 555 timer as stable multivibrator.

    (**OR**)

    b) Subtract the decimal – 108 from 14 in 2's complement
       representation.

13. a) Explain the operation of edge triggered JK flip-flop with suitable
       logic circuit.   (**OR**)

    b) Explain the function of A/D converter.

14. a) Derive the formula for the instantaneous value of an FM voltage.

    (**OR**)

    b) With the aid of block diagram, explain the operation of an AFC
       system.

15. a) What are various registers of 8085? Discuss their function.

    (**OR**)

    b) Write a program to add two 8 bit decimal numbers to get a sum
       of 8 bits.

SECTION – C

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

16. Explain the operation of 16 to 1 multiplexer with its logic circuit.
17. Write a note on arithmetic building blocks.
18. Explain the action of asynchronous counter.
19. Explain pulse code modulation. Draw one complete cycle of some
    irregular waveform and show how it is quantized, using eight
    standard levels.
20. Discuss the various instruction set of 8085 microprocessor.

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B.Sc. Physics Degree (Semester) Examinations, November 2017
Part – III : Elective Subject : Fifth Semester : Paper – I

OBJECT ORIENTED PROGRAMMING IN C++
Under CBCS – Credit 5

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions: (10 × 1 = 10)

1. Which of the following provides the idea of reusability?

   a) Data Abstraction   b) Inheritance

   c) Polymorphism   d) Dynamic Binding

2. Inline function eliminates the _____ of calls to simple function.

   a) cost   b) speed   c) time   d) size

3. Variables declared inside the class are known as _____.

   a) class   b) object   c) derived class   d) data member

4. _____ enables and object to initialize itself when it is created.

   a) class   b) object   c) derived class   d) constructor

5. The mechanism of deriving a class from another derived class is

   _____ inheritance.

   a) multilevel   b) multiple   c) single   d) base

6. _____ is the ability to take more than one form.

7. _____ operators can't be overloaded.

8. Static member is called by using the name of the _____ rather

   than an object variable.

9. Compile time polymorphism is _____.

10. The default visibility mode is _____.

SECTION – B

Answer ALL Questions: (5 × 7 = 35)

11. a) Explain the Application of C++.

    (OR)

    b) Explain the benefits of OOPs.

12. a) Discuss about Inline function with example.

    (OR)

    b) Write about the various operators in C++.

13. a) Discuss about static data members.

    (OR)

    b) How will you define member functions outside the class
       definition?

14. a) Write down the rules to be followed for operator overloading.

    (OR)

    b) What are the various types of constructor? Explain any two of
       them with example.

15. a) Write about Multiple Inheritance.

    (OR)

    b) What are virtual base classes? Discuss.

SECTION – C

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

16. Write a C++ program to find the largest value among any four
    numbers.

17. Write a program to find volume of the Cube, Cylinder and
    Rectangle using function overloading.

18. Write a C++ program to find average of two numbers using
    FRIEND function.

19. Write a C++ program using overloading unary minus operator.

20. Write a C++ program to implement the concept of 'single
    inheritance'.

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B.A./B.Sc. Degree (Semester) Examinations, November 2017

Part – IV : NME 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. The Indian Space Programme is driven by the vision of

   a) Dr.Vikram Sarabhai   b) Dr.Kirankumar

   c) Dr.Radhakrishnan   d) Dr.Abdul Kalam

2. How many planets in our solar system

   a) nine   b) five   c) eight   d) four

3. The term AM stands for

   a) Amplitude Management   b) Amplitude Modulation

   c) American Modelling   d) All modules

4. The term optical stands for

   a) sound   b) frequency   c) light   d) velocity

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

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

6. What is astrophysics?

7. Write down the constituents of solar systems?

8. Give any two points about the Pluto planet

9. What is OFC?

10. What do you mean by modulation?

SECTION – B

Answer ALL Questions: **(4 × 10 = 40)**

11. a) Briefly explain the phenomenon of Solar system

    (OR)

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

12. a) Write a brief account of Scorched Mercury

    (OR)

    b) Jupiter the Giant. Give it's your comment.

13. a) Describe the theory of Mysterious Uranus

    (**OR**)

    b) Explain the AM, FM and Phase modulation.

14. a) Explain the following
    i) Information   ii) Transmitter   iii) Channel

    (**OR**)

    b) Give a brief account of bandwidth requirements.

SECTION – C

Answer any TWO Questions: $(2 \times 12\frac{1}{2} = 25)$

15. Discuss about the Saturn and its rocky rings.

16. Write down the various benefits of optical fibre communication

    system.

17. Describe in detail about the Geo stationary satellite.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]
B.Sc. Physics Degree (Semester) Examinations, November 2017
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)

1. The flux or radiation intensity at the mean earth-sun distance is
   a) 1200 W/m^2 b) 1353 W/m^2 c) 1800 W/m^2 d) 1400 W/m^2

2. An instrument used for the measurement of only terrestrial radiation is
   a) Pyranometer   b) Pyrheliometer   c) Pyrgeometer d) Pyradiometer

3. Copper is generally preferred for the absorber plate due to its
   a) high conductivity   b) low conductivity
   c) resistance to corrosion
   d) high conductivity as well as resistance to corrosion

4. Most commonly used cover plate material for solar collectors is
   a) ordinary glass   b) tempered glass
   c) thermoplastics   d) none of the above

5. The capacity of Large stand-alone PV power generating system is generally between
   a) 500 to 2000 kWp   b) 1000 to 3000 kWp
   c) 2000 to 3000 kWp   d) 500 to 4000 kWp

6. Sun is a black body radiator at a temperature of _____.

7. Solar concentrators are generally classified as _____.

8. The optimum operating voltage of a photovoltaic cell is generally about _____ at normal temperature.

9. The most suitable pumps for operations in PV water pumping systems is _____.

10. Two broad kinds of solar furnaces are _____.

SECTION – B

Answer ALL Questions: (4 × 10 = 40)

11. a) Explain the Sunshine recorder with neat diagram.
    (OR)
    b) Describe the working principle of a typical air collector.

12. a) How selection of materials for flat-plate collectors is done? Explain the materials used for designing absorber plate.
    (OR)
    b) What are the advantages and disadvantages of focusing type collector over a flat-plate collector?

13. a) Describe the main applications of solar PV systems.
    (OR)
    b) Elucidate the advantages and disadvantages of Photovoltaic Solar Energy Conversion.

14. a) What is a solar furnace? Describe the different configurations of it.   **(OR)**
    b) Enlist the merits and demerits of box type solar cooker.

SECTION – C

Answer any TWO Questions: (2 × 12$\frac{1}{2}$ = 25)

15. Describe in detail various parts of a typical liquid flat-plate solar collector.

16. Discuss various types of focusing reflector systems, stating concentration ratio in each case.

17. Explain design principle and constructional details of box type solar cooker.

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B.Sc. Physics Degree (Semester) Examinations, November 2017
Part – IV : Skill Based Subject : Fifth Semester : Paper – I

OPTO ELECTRONICS - I
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions: **(10 × 1 = 10)**

1. The doping element of orange emitting LED is

   a) sulphur   b) tellurium   c) zinc   d) boron

2. Einstein coefficient for stimulated emission process is

   a) B_{21} b)A_{21} c)B_{12} d)R_{21}

3. The outer part of the optical fibre is

   a) Cladding   b) Core

   c) polymer coating   d) plastic cover

4. Which of the semiconductor can be used to fabricate a LED?

   a) Si   b) Ge   c) GaAs   d) GaP

5. Which of the following is more sensitive?

   a) PIN diode   b) APD   c) RAPD   d) Zener Diode

6. A cavity structure used in _____.

7. Attenuation in optical fibre can be measured in _____.

8. Transmission of signal through optical fibre is of the form of _____.

9. _____ having the highest refractive index.

10. The full form of RAPD is _____.

SECTION – B

Answer ALL Questions: (4 × 10 = 40)

11. a) Explain the acceptance angle and acceptance cone of optical
    fibers.   **(OR)**

    b) i) Compute the NA, acceptance angle and the critical angle of the
        fibre having μ_1 (core refractive index) = 1.50 and the refractive
        index of the cladding = 1.45.

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

12. a) Explain Stepped index monomode fiber in detail.

                    (OR)

    b) Illustrate the design of LED for optical communications.

13. a) Explain about the basic principle of laser action.

                    (OR)

    b) i) Compare Single mode and multimode fiber

    ii) Write a note on plastic fibres and its characteristics.

14. a) Explain about the basic structure of an optical fiber and
    propagation of light wave through it.

                    (OR)

    b) i) A lamp is operating at a temperature of 727°C and emitting
        radiation of an wavelength of 0.5 µm. Calculate the ratio
        between the stimulated and spontaneous emission rate.

    ii) A Phototransistor has a collector current of Ic =16 mA when
        the incident power at a wavelength of 1.25µm is equal to
        130µw. Calculate the optical gain of the phototransistor under
        the above operating condition. Determine the common emitter
        current gain h_{FE} when the quantum efficiency of the base
        collector is 45% at a wavelength of 1.25 MW.

SECTION – C

Answer any TWO Questions: $(2 \times 12\frac{1}{2} = 25)$

15. Derive the Einstein's relations for stimulated emission and

    spontaneous emission in Laser.

16. Explain about the basic theory of DHLED and also discuss about the

    different LED structures.

17. Explain   i) p-n- Junction Photodiode

                ii) p-i-n Photodiode.

                iii) Phototransistor.

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B.A./B.Sc. Degree (Semester) Examinations, November 2017
Part – IV : NME 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)

1. Army day of India is

   a) 30th January   b) 15th January

   c) 8th October   d) Last Sunday of November

2. The number of NCC directorate is

   a) 15   b) 17   c) 18   d) 16

3. The Kunzru's committee formed in the year of

   a) 1947   b) 1948   c) 1950   d) 1946

4. OTA is located at

   a) Gwalior   b) Kamptee   c) Chennai   d) Delhi

5. The name of a group of 3 company and 1company commander is

   a) Battalion   b) Section   c) Company   d) Platoon

6. Indian military academy (IMA) is located at_____.

7. The NCC day of India is_____.

8. The Motto of NCC is _____.

9. Expand the term ATC: _____.

10. Expand the term RDC: _____.

SECTION – B

Answer ALL Questions: (4 × 10 = 40)

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

    (OR)

    b) Draw the different ranks in army officer.

12. a) Expand the following terms:

    i) ALC   ii) PRDC iii) CATC iv) BLC   v) NIC

    (OR)

    b) Explain the badges of ranks for Navy.

13. a) Draw the structures of NCC organization.

    (OR)

    b) b) What are the duties of good citizen?

14. a) Write down the man management in NCC.

    (OR)

    b) b) Explain the noise pollution.

SECTION – C

Answer any TWO Questions: (2 × 12 ½ =25)

15. Explain the types of fire, fire-fighting equipments and its

    parties.

16. Write an essay about the national integration.

17. Explain the air pollution and water pollution.

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