VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]
B.Sc. (Maths / Chem.) Degree (Semester) Examinations, November 2015
Part – III : Allied Subject : First Semester : Paper – I

PHYSICS – I
Under CBCS – Credit 4

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

SECTION – A

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

1. Kepler's second law is a consequence of the conservation of _____.
   a) angular momentum b) linear momentum
   c) energy d) all the above
2. Work done by a particle along a circular path is zero. (True / False)
3. A cylinder of radius r and length l is rigidly fixed at one end, the couple required is proportional to _____.
   a) r^2 b) r^3 c) r^4 d) r
4. The working of venturimeter depends on _____.
5. Beats can be heard when the difference of frequencies is not more than _____.
   a) 4 b) 6 c) 10 d) 20
6. Ultrasonics waves are used for stirring liquid solutions because they can produce perfectly homogeneous solution. (True / False)
7. An adiabatic process occurs at constant _____.
   a) temperature b) pressure c) heat d) All the above
8. The ratio of adiabatic and isothermal elasticities of a gas is _____.
9. Interference is redistribution of _____.
   a) wavelength b) intensity c) mass d) phase
10. The Raman effect depends upon the frequency of the incident light. (True / False)

SECTION – B

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

11. a) State the Kepler's law of planetary motion and explain.

(OR)

b) A sphere of mass 19 Kg is attached by another sphere of mass 150 Kg, when their centres are separated by a distance of 0.28m with a force of 2.4×10^{-6} N. Calculate the gravitation constant, if the distance is halved, what would be the new force?

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

(OR)

b) A bar of length 1m,breadth 0.02m and thickness0.005 m is supported at its two ends and loaded in the middle. For a load of 0.4 Kg the depression at the centre is 2×10^{-3} m. Calculate the Young's modulus of the material of the bar.

13. a) State the property of stationary waves.

(OR)

b) The speed of compressional wave in silver of density 10.5Kg/m^3 is 2610m/s.Compute the Young's modulus of elasticity for silver

14. a) Derive an expression for work done during an isothermal process.

(OR)

b) Find the efficiency of the Carnot's engine working between the steam point and ice point.

15. a) Describe the Young's experiment and derive an expression for

i) intensity at a point on the screen ii) fringe width

(OR)

b) Calculate the thickness of double refracting plate capable of producing a path difference $\lambda/4$ between extraordinary and ordinary rays. given $\lambda = 5890A^{o}$. $n_e = 1.553$ $n_0 = 1.544$

SECTION – C

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

16. Define gravitational constant G. Explain how would you determine the value of G by Boy's method.
17. Derive an expression for bending moment.
18. What are ultrasonics waves? Explain the production of ultrasonics waves.
19. State and explain second law of thermodynamics.
20. What is Raman effect? Explain the experimental study and quantum theory of Raman effect.

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B.Sc. Physics Degree (Semester) Examinations, November 2015
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)**

1. The dimensional formula for force is _____.
   a) $\frac{ML^2}{T}$ b) $\frac{ML}{T^2}$ c) MLT^2 d) $ML^{-1}T^{-2}$
2. The downward force of Earth's gravity acting on the body is called the _____ of the body.
   a) mass b) weight c) force d) acceleration
3. In _____ motion both velocity and acceleration is constant in magnitude and change their directions.
4. The forces acting between surfaces in relative motion are called forces of _____ friction.
5. In elastic collision both linear momentum and kinetic energy are conserved. (True / False)
6. The linear momentum is the product of
   a) mass and velocity b) velocity and time
   c) force and velocity d) force and time
7. If the force acts opposite to the direction of the displacement, then that force does _____ work.
   a) positive b) negative
   c) both positive and negative d) zero
8. S.I unit of power is J/S. (True / False)
9. The magnitude of normal force per unit area is called as _____.
10. The actual pressure at a point in a fluid is called the _____ pressure.
    a) atmospheric b) gauge c) absolute d) all the above

SECTION – B

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

11. a) State and explain Newton's laws of motion.

(OR)

b) A ball is thrown vertically upward from the ground with a speed of $25 \, m/s$.

i) How long does it take to reach its highest point?

ii) How high does it rise?

12. a) Calculate the period of motion of a conical pendulum.

(OR)

b) A satellite of mass $1250kg$ is to be placed in a circular orbit at a height $h = 210km$ above the earth's surface, where $g = 9.2 \, m/s^2$.

i) What is the weight of the satellite at this altitude?

ii) With what tangential speed must it be inserted into its orbit? The Earth's radius is $R = 6370kg$.

13. a) What is linear momentum? State and explain the principle of conservation of linear momentum?

(OR)

b) A glider of mass $1.25kg$ moves with a velocity $3.62 \, m/s$ on a frictionless, level air track and collides with a second glider of mass $2.3kg$ that is initially at rest. After the collision, the first glider is found to be moving at $1.07 \, m/s$ in a direction opposite to that of its initial motion. What is the velocity of second glider after the collision?

14. a) Obtain an expression for the kinetic energy in rotational motion.

(OR)

b) A block of mass $3.63kg$ slides on a horizontal frictionless table with a speed of $v = 1.22 \, m/s$. It is brought to rest in compressing a spring in its path. By how much is the spring compressed if its force constant k is $135 \, N/m$?

15. a) Explain streamline and obtain the equation of continuity.

(OR)

b) Water flows through a pipe line of varying cross section. At one level A the cross-sectional area is $1.2cm^2$ and that of another level B is $0.35cm^2$. The two levels are separated by a vertical distance $h = 45mm$. At what rate does water flow from the pipe.

SECTION – C

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

16. Discuss some possible kinds of motion in one dimensional kinematics and derive the equations of one dimensional kinematics.
17. Prove that the trajectory of a projectile is parabolic and find the horizontal range for the projectile.
18. Derive the expressions for two body collisions using the law of conservation of momentum.
19. Explain work-energy theorem.
20. Deduce Bernoulli's equation.

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B.Sc. Physics Degree (Semester) Examinations, November 2015

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

OPTICS AND SOUND

Under CBCS – Credit 4

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

SECTION – A

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

1. Which of the following is not the applications of Doppler effect?
   a) Rotation of the sun b) Discovery of double stars
   c) Red shift d) Optical maser
2. If the path difference is an odd number multiple of half wavelength the point is bright. (True / False)
3. Rectilinear propagation of light can be easily explained on the basis of _____.
   a) wave theory b) Quantum theory
   c) Electromagnetic theory d) Corpuscular theory
4. In the Fresnel diffraction the source or the screen or both are at finite distance from the aperture. (True / False)
5. The polarizing angle for glass surface is _____.
   a) 57.5^{o} b) 57.4^{o} c) 57.3^{o} d) 57.2^{o}
6. The phenomenon of polarization has helped to establish that light waves are transverse waves. (True / False)
7. Which of the following is the necessary condition for SHM?
   a) constant period b) constant acceleration
   c) constant displacement and acceleration
   d) constant displacement and torque

8. A linear harmonic oscillator has a total energy of 160 J. its maximum kinetic energy is 160 J. (True / False)

9. Which of the following does not affect the velocity of sound?
   a) temperature of the gas b) pressure of the gas
   c) mass of the gas d) specific heat capacity of the gas

10. When the sound waves passes from one medium to another, there is a change of wavelength and velocity. (True / False)

SECTION – B

Answer ALL Questions : (5 × 7 = 35)

11. a) Show that separation between adjacent maxima is $\Delta y=\lambda D/d$ in double slit interference.

(OR)

b) In moving one mirror in a Michelson interferometer through a distance of 0.1474 mm,500 fringes cross the centre of the field of view. What is the wavelength of light?

12. a) Derive an expression for the diffraction at the circular aperture.

(OR)

b) An parallel beam of monochromatic light is allowed to be incident normally on a plane transmission grating having 5000 lines/cm and the second order spectral lines is found to be diffracted through 30^0.Calculate the wavelength of light.

13. a) How would you obtain plane polarized light by reflection?

(OR)

b) Plane polarized light is incident on a piece of quartz cut crystal parallel to the axis. Find the least thickness for which the ordinary and exordinary rays combine to form plane polarized light.

14. a) Derive an expression for frequency of oscillation of simple pendulum.

(OR)

b) For a damped oscillator m = 250 g, K = 85 N/m and b = 70 g/s. What is the period of the motion?

15. a) Derive the equation of sound wave as a displacement waves.

(OR)

b) An electric spark jumps along a straight line of length l = 10 m, emitting a pulse of sound that travels radially outward from the spark. The spark is said to be a line source of sound. The power of emission is $Ps = 1.6 \times 10^4$ W. What is the intensity of the sound when it reaches a distance r = 12 m, from thr spark?

SECTION – C

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

16. Give the complete description of Michelson's interferometer. Discuss how the wavelength of monochromatic radiation can be determined in the laboratory with the help of this interferometer.

17. Explain the phenomenon of double refraction in a calcite crystal.

18. Give the theory of a plane transmission grating and describe how it is used to determine the wavelength of light.

19. Obtain the expression for total energy of a particle executing simple harmonic motion.

20. Derive the expression for power and intensity of sound wave.

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B.Sc. Physics Degree (Semester) Examinations, November 2015
Part – III : Core Subject : Third Semester : Paper – I

NUMERICAL METHODS
Under CBCS – Credit 5

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

SECTION – A

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

1. $f(x) = 2x^3 - 9x^2 + 12x + 6$ is a polynomial of degree _____.
   a) two b) three c) one d) four
2. Give an example for transcendental equation.
3. Gauss-Elimination method of solving simultaneous linear algebraic equation is _____.
   a) direct method b) indirect method
   c) iterative method d) none of these
4. Write 'n' linear equation in 'n' unknowns.
5. Polynomial interpolation is used to compute _____.
   a) Values of arguments b) integration
   c) differentiation d) all of the above
6. Why do we prefer polynomial interpolation?
7. *If* we put $n = 3$ in Newton-Cote's formula we get _____.
   a) Trapezoidal rule b) Simpson's one-third rule
   c) Simpson's three-eighths rule d) Romberg method
8. Write Newton-Cote's quadrature formula.
9. In Runge-Kutta algorithm, k_1 is defined as _____.
   a) $k_1 = \Delta x$ b) $k_1 = hf(x, y)$ c) $k_1 = k_2$ d) $k_1 = \Delta y - \Delta x$
10. List out the equations of Fourth order Runge-Kutta algorithm.

SECTION – B

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

11. a) Find a positive root of $x\,e^{x}=2$ by the method of false position.

(OR)

b) Find the positive root of $f(x)=2x^{3}-3x-6=0$ by Newton-Raphson method. Correct to five decimal places.

12. a) Solve by Gauss-Elimination method

$$3x+4y+5z=18$$
$$2x-y+8z=13$$
$$5x-2y+7z=20$$

(OR)

b) Solve the system of equations by Gauss-seidal method

$$x+y+54z=110$$
$$27x+6y-z=85$$
$$6x+15y+2z=72$$

13. a) From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 46 *and* 63.

Age x:	45	50	55	60	65
Premium y:	114.84	96.16	83.32	74.48	68.48

(OR)

b) Apply Gauss's forward formula to find $f(x)$ at $x=3.5$ from the table below

x:	2	3	4	5
$f(x)$:	2.626	3.454	4.784	6.986

14. a) A rod is rotating in a plane. The following table gives the angle 'Θ' (in radians) through which the rod has turned for various values of time t (sec). Calculate the angular velocity and angular acceleration of the rod at 0.6 sec

t:	0	0.2	0.4	0.6	0.8	1.0
Θ:	0	0.12	0.49	1.12	2.02	3.20

(OR)

b) A river is $80m$ wide. The depth 'd' in meteres at a distance 'x' meters from one bank is given by the following table. Calculate the area of cross section of the river using Simpson's rule.

x:	0	10	20	30	40	50	60	70	80
d:	0	4	7	9	12	15	14	8	3

15. a) Using Taylor series method, find correct to four decimal places, the value of $y(0.1)$ Given $\frac{dy}{dx}=x^{2}+y^{2}$ *and* $y(0)=1.$

(OR)

b) Using Euler's method, solve numerically the equation $y'=x+y,$ $y(0)=1$ *for* $x=0.0,(0.2),(1.0)$ Check your answer with exact solution.

SECTION – C

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

16. Find the positive root of $x^{2}-x=1$ by bisection method.
17. How do you solve simultaneous linear algebraic equation using Gauss- Elimination method?
18. Apply Gauss's forward central difference formula and estimate $f(32)$ from the following table

x	25	30	35	40
$y=f(x)$	0.2707	0.3027	0.3386	0.3794

19. Evaluate $\int_{0}^{1}\frac{dx}{1+x^{2}}$ using Trapezoidal rule with $h=0.2$ Hence obtain approximate value of π.
20. Apply the fourth order Runge-Kutta method to find $y(0.2)$ Given that $y'=x+y;\ y(0)=1.$

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B.Sc. Physics Degree (Semester) Examinations, November 2015
Part – III : Core Subject : Third Semester : Paper – II

ATOMIC AND MOLECULAR SPECTROSCOPY
Under CBCS – Credit 5

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

SECTION – A

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

1. The first model of an atom was given by _____.
   a) J.J.Thomson b) Rutherford c) Bohr d) Sommerfeld
2. When an electron jumps from an outer orbits to the first orbit, we get the _____ series which lies in the ultraviolet region.
3. The vector sum of all the individual j vector gives total _____ of the atom.
4. The Stark effect is the magnetic analogue of the Zeeman effect. (True / False)
5. The diatomic molecule which give rise to rotational spectra is _____.
   a) H_2 b) O_2 c) HCL d) N_2
6. Give an example of spherical top molecule.
7. Wave number is the reciprocal of _____.
   a) frequency b) wave length c) time d) velocity
8. Infrared spectrum of a chemical substance is a _____ for its identification.
9. The lines having wavelengths greater than that of the incident wavelength are called stokes lines. (True / False)
10. The nucleus which alternately becomes excited and unexcited is said to be in the state of _____.

SECTION – B

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

11. a) State and explain Bohr's correspondence principle.

(OR)

b) Calculate the radius and energy of the electron in the n^{th} orbit in hydrogen from the following data. ($e = 1.6\times10^{-19}$ coulomb, $m = 9.1\times10^{-31} Kg$, $h = 6.6\times10^{-34}$ joule second, $\varepsilon_0 = 8.85\times10^{-12}\ farad/metre$ and $c = 3\times10^{8}\ m/s$)

12. a) Explain L-S coupling and j-j coupling schemes.

(OR)

b) Calculate the wavelength separation between the two component lines which are observed in the normal Zeeman effect. The magnetic field used is $0.4\ weber/m^2$, the specific charge $= 1.76\times10^{11} C\ Kg^{-1}$ *and* $\lambda = 6000\ \overset{o}{A}$.

13. a) Obtain an expression for the rotational energy levels of a diatomic molecule taking it as a rigid rotator.

(OR)

b) The rotational spectrum for HI show a series of lines separated by $12.8 cm^{-1}$. Find the moment of inertia and bond angle. $(m_1 = 1.008g;\ m_2 = 127g)$

14. a) Discuss the theory of vibrating diatomic molecule as anharmonic oscillator.

(OR)

b) Explain the range of Infrared radiations.

15. a) Explain chemical shift.

(OR)

b) Give the difference between Raman spectra and Infrared spectra.

SECTION – C

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

16. What is critical potential? Describe the Frank and Hertz's experimental arrangement to determine critical potentials and explain the graph.

17. Describe Stern and Gerlach experiment. Mention the important results of the experiment.

18. Describe the applications of microwave spectroscopy.

19. Discuss in detail the instrumentation and working of Infrared spectrometer.

20. Discuss in detail about classical theory and quantum theory of Raman effect.

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B.Sc. Physics Degree (Semester) Examinations, November 2015
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. The coordination number in the case of a simple cubic crystal structure is
   a) 12 b) 6 c) 2 d) 1
2. Miller indices of the plane parallel to *x and y* axis are (001). (True / False)
3. X-rays are used for diffraction studies in crystals because the _____ of radiation is of the same range as that of interatomic spacing.
4. _____ are called dislocations.
   a) surface imperfections b) line defects
   c) stacking faults d) twin boundary
5. The property of becoming electrically polarized when mechanical stress is applied is known as _____.
6. According to Debye model the Debye temperature should be dependent of temperature. (True / False)
7. The temperature at which the transition of antiferro to paramagnetism takes place is called
   a) Curie-Weiss temperature b) Curie temperature
   c) Debye temperature d) Neel temperature
8. Paramagnetic susceptibility varies inversely with temperature. (True / False)
9. When a material becomes superconductor the properties of _____ do not change.
10. Magnetic susceptibility for superconductor is
    a) $\chi = 1$ b) $\chi = -1$ c) $\chi < 1$ d) $\chi > 1$.

SECTION – B

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

11. a) Define coordination number and packing fraction. Workout the coordination number and packing factor for FCC structure.

(OR)

b) Show that in a simple cubic lattice the separation between the successive planes $(100),(110)$ *and* (111) are in the ratio of $1:0.71:0.58$.

12. a) Explain the principle, procedure and advantage of Debye-Scherrer method of X-ray diffraction.

(OR)

b) A beam of x-rays are incident on a sodium chloride crystal (lattice spacing = 0.282 nm). The first order Bragg reflection is observed at a glancing angle of $8°35'$. What is the wavelength of x-rays?

Also calculate the maximum order of diffraction possible.

13. a) Explain orientational polarization.

(OR)

b) The dielectric constant of He gas at NTD is 1.0000684. Calculate the electronic polarizability of He atoms if the gas contains 2.7×10^{25} *atoms per* m^3.

14. a) Write the properties of paramagnetic materials.

(OR)

b) The saturation magnetic induction of nickel is $0.65\ {}^{wb}\!/_{m2}$. If the density of nickel is $8906\ {}^{kg}\!/_{m3}$ and its weight is 58.7, calculate the magnetic moment of the nickel atom in bohr magneton.

15. a) Explain Type I and Type II superconductors.

(OR)

b) Calculate the critical current for a wire of lead having a diameter of 1mm at $4.2K$. The critical temperature for lead is $7.18K$ *and* $H_0 = 6.5\times10^4\ {}^{A}\!/_{m}$.

SECTION – C

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

16. What do you understand by Miller indices? Obtain a relation between the interplanar spacing.

17. Obtain an expression for the equilibrium concentration of vacancies at a given temperature in a metallic crystal.

18. Discuss the variation of specific heat capacity of solids with temperature on the basis of Einstein's theory.

19. Give an account of Weiss theory of ferromagnetism.

20. Derive London equations and discuss their significance.

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B.Sc. Physics Degree (Semester) Examinations, November 2015
Part – III : Core Subject : Fifth Semester : Paper – II

ELECTRONICS & COMMUNICATION – II
Under CBCS – Credit 4

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

SECTION – A

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

1. De Morgan's first theorem $\overline{A+B}$ = _____.
   a) $\overline{AB}$ b) $\overline{A}+\overline{B}$ c) $\overline{A}.\overline{AB}$ d) $\overline{A}.\overline{B}\,\overline{A}.\overline{\overline{B}}$
2. BCD stands for _____.
3. The SUM output of a full adder is easily implemented using
   a) An inverter b) NAND c) AND d) EX-OR
4. The stable output state of a 555 timer in _____ mode is low.
5. A flip-flop is a bistable electronic circuit that has two stable states. (True / False)
6. _____ flip-flops are required to construct a mod-128 counter.
   a) 8 b) 7 c) 4 d) 10
7. Boosting of the higher modulating frequencies, in accordance with prearranged curve is termed as De-emphasis. (True / False)
8. Which of the following pulse modulation system is analog?
   a) PCM b) Delta c) PAM d) All the above
9. The largest number that appear on the data bus is
   a) $(128)_{10}$ b) $(16)_{10}$ c) $(255)_{10}$ d) $(64)_{10}$
10. _____ is a binary pattern designed inside a micro processor to perform a specific function.

SECTION – B

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

11. a) Draw the symbol and truth table of NAND gate and explain its universality.

(OR)

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

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

(OR)

b) Subtract the decimal 16 from -38 in 2's complement representation.

13. a) Explain the operation of edge triggered JK flip-flop with its logic diagram and characteristic table.

(OR)

b) Explain the action of DAC0808 in detail.

14. a) Compare FM and AM.

(OR)

b) Determine the value of the capacity reactance obtainable from a reactance FET whose gm is 12 millisiemens. Assume that the gate-to-source reactance is one-ninth of the reactance of the gate-to- drain capacitor and that the frequency is 5 MHz.

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

(OR)

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

SECTION – C

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

16. What is a Demultiplexer?
Explain the action of 1 to 16 demultiplexer with its logic circuit.

17. Write a note on arithmetic building blocks.

18. Explain the action of Ripple counter with suitable waveforms.

19. What is frequency modulation? Obtain an expression for the instantaneous value of the frequency modulated voltage.

20. Explain the classification of 8085 microprocessor instruction set.

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B.Sc. Physics Degree (Semester) Examinations, November 2015
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. C++ is a
   a) Object Based Language b) Object Oriented Language
   c) Object Orientation Language
   d) Object Oriented and Based Language
2. The process of building new classes from existing one is called _____.
   a) Polymorphism b) Structure c) Inheritance d) Cascading
3. The operator that cannot be overloaded is
   a) ++ b) :: c) ( ) d) ~
4. Constructor is a
   a) method b) member c) Data d) object
5. Function with same with different parameter is
   a) Structure b) Inheritance c) Polymorphism d) Template
6. Cout is an Input Statement. (True / False)
7. :: is an Scope Resolution Operator. (True / False)
8. ~ symbol is used for destructor. (True / False)
9. C++ support for polymorphism. (True / False)
10. C++ does not support inheritance. (True / False)

SECTION – B

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

11. a) Explain the OOPs Concept in detail.
    (OR)
    b) Write the structure of C++ Program.
12. a) List the different operators in C++ explain it.
    (OR)
    b) Explain about manipulators in C++.
13. a) Explain about friend function with an example.
    (OR)
    b) Explain about inline functions in C++.
14. a) Explain about parameterized constructor in C++.
    (OR)
    b) Explain about operator overloading in C++.
15. a) Explain about Multilevel Inheritance.
    (OR)
    b) Explain about Virtual function in C++.

SECTION – C

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

16. Write a program to find the largest value among any four numbers.
17. Write a program to find the sum of even numbers using do – while loop.
18. Write a program to find the sum and average of given numbers.
19. Write a program to find the factorial of the given number using recursive function.
20. Write a program to find multiplication and division of two number using “inline function.

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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 Research Organization (ISRO) head quarters is located at
   a) Chennai b) Bangaluru c) Delhi d) Kerala
2. How many planets in our solar system
   a) Nine b) Five c) Eight d) None of these
3. The only natural satellite of the earth is
   a) Sun b) Moon c) Saturn d) None of these
4. The term optics stands for
   a) Sound b) Frequency c) Light d) Waves
5. A body moving in an orbit around a planet is known as
   a) Rocket b) Missile c) Satellite d) All the above
6. What is ISRO?
7. Write down the constituents of solar systems?
8. Define the term communication.
9. What is OFC?
10. Define modulation.

SECTION – B

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

11. a) Discuss about the phenomenon of Solar system.

(OR)

b) Briefly explain the Moon: the closest neighbour.

12. a) Write a brief account of Scorched Mercury.

(OR)

b) Explain the concept of Jupiter the Giant.

13. a) Give a detailed note on Mysterious Uranus.

(OR)

b) Explain the types of Communication and discuss about the FM and AM modulation.

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

(OR)

b) Explain the phenomenon of Multistage Rocket.

SECTION – C

Answer any TWO Questions : **(2 × 12½ = 25)**

15. Describe the theory of Saturn and its rocky rings.
16. Write down the advantages of optical fiber communication system.
17. Give the brief account of Geo stationary satellite.

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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[Affiliated to Madurai Kamaraj University]
B.Sc. Physics Degree (Semester) Examinations, November 2015
Part – IV : Skill Based Subject : Third Semester : Paper – I

ENERGY SCIENCE – I
Under CBCS – Credit 2

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

SECTION – A

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

1. The sun is a sphere of intensely hot gaseous matter, continuously generating heat by thermo-nuclear _____ reactions.
   a) chain b) fission c) both a and b d) fusion
2. The value of solar constant is 1353 W/m^2. (True / False)
3. The focusing or concentrating systems can be used for _____ generation.
4. The amount of material used for a curved mirror is small than would be needed for a flat plate collector. (True / False)
5. The majority of the flat-plate collector have _____ main components.
   a) five b) seven c) three d) two
6. The dust deposit on the cover system reduces the transmissivity of the cover system. (True / False)
7. Basically air heaters are classified in to _____ categories.
8. The average solar radiation received on horizontal surface in India is of the order of
   a) 400 *to* 700 $cal/cm^2/day$ b) 300 *to* 700 $cal/cm^2/day$
   c) 100 *to* 700 $cal/cm^2/day$ d) none of the above
9. Solar energy is a _____ dependent and intermittent energy resource.
10. The most common heat transfer fluid for a solar system is
    a) oil b) air c) water d) none of these

SECTION – B

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

11. a) Discuss about the structure of the sun.
    (OR)
    b) Explain the principle, working of a most common type Pyranometer?
12. a) What is solar collector? Describe the construction and working of a typical liquid collector.
    (OR)
    b) Discuss the various types of concentrating collectors with necessary diagrams.
13. a) i) What are the main components used in the flat plate collector.
    ii) Explain the effect of dust and shading.
    (OR)
    b) Explain the selection of materials for flat plate collectors.
14. a) Discuss the various types of air heaters with neat diagram.
    (OR)
    b) Describe a hydronic thermal storage tank under following heads:
    i) insulation ii) size and configuration iii) material

SECTION – C

Answer any TWO Questions : **(2 × 12½ = 25)**

15. Describe Angstrom type Pyrheliometer? What are the names of other important Pyrheliometers?
16. Briefly explain the Compound Parabolic Collector system with suitable diagram.
17. Describe in detail about the electrical storage method and chemical storage method.

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B.Sc. Physics Degree (Semester) Examinations, November 2015
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 optical wavelength in the substance is
   a) b) c) d)
2. The range of numerical aperture value for the long distance communication is
   a) 0.4 to 0.5 b) 0.1 to 0.3 c) 0.4 to 0.6 d) 0.8 to 1.2
3. The doping element of red emitting LED is
   a) sulpher b) tellurium c) zinc d) boron
4. Einstein coefficient for spontaneous emission process is
   a) B_{21} b) A_{21} c)B_{12} d)R_{21}
5. In photo diode, photons enter in _____ layer.
   a) Depletion b) p-type c) n-type d) both p & n type
6. List out the three sections of optical fibers.
7. Expand the term PCS fiber.
8. Expand the term DHLED.
9. In the population inversion process of laser is $n_2 < n_1$. (True / False)
10. Expand RAPD.

SECTION – B

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

11. a) Compare Single mode and multimode fiber.
    (OR)
    b) 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.
12. a) Explain Stepped index monomode fiber in detail.
    (OR)
    b) Calculate the refractive indices of the core and cladding material of a fiber from the following data: NA = 0.22 and Δ =0.012.
13. a) Describe the theory of DHLED structure.
    (OR)
    b) A lamp is operating at a temperature of 727^{o}C and emitting radiation of an wavelength of 0.5 μm. Calculate the ratio between the stimulated and spontaneous emission rate.
14. a) Explain the function of p-i-n Avalanche diode.
    (OR)
    b) Write a short note on Plastic fibre.

SECTION – C

Answer any TWO Questions : **(2 × 12½ = 25)**

15. Explain about the basic structure of an optical fiber and propagation of light wave through it.
16. Explain the acceptance angle and acceptance cone of optical fibers.
17. Derive the Einstein's relations for stimulated emission and spontaneous emission in Laser.

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B.A. / B.Sc. Degree (Semester) Examinations, November 2015

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. The Kunzru committee formed in the year of
   a) 1946 b) 1947 c) 1950 d) 1948
2. The number of NCC directorate is
   a) 17 b) 15 c) 18 d) 16
3. The head quarters of Tamilnadu, Pondicherry, Andaman and Nicobar directorate is
   a) Chennai b) Puducherry c) Trichy d) Andaman
4. In the tricolor NCC emblem, the red color represents
   a) Army b) Navy c) Air force d) All the above
5. The name of a group of 3section and 1 commander is
   a) Platoon b) Section c) Company d) Battalion
6. OTA located at
   a) Kamptee b) Chennai c) Gwalior d) Delhi
7. Indian military academy (IMA) is located at
   a) Dehradun b) Wellington c) Chennai d) Pune
8. The Army day is
   a) January 15 b) August 5 c) January 26 d) September 5
9. Expand the term AAC:
10. Expand the term CATC:

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) ATC iv) IGC v) NIC

(OR)

b) Explain the technical and non-technical branches of Army.

13. a) Explain about AIDS?

(OR)

b) Explain the badges of ranks for Navy.

14. a) Explain the functions of civil defence.

(OR)

b) Explain the noise pollution.

SECTION – C

Answer any TWO Questions : **(2 × 12½ = 25)**

15. Explain the different services in Army.
16. Describe the first aid, health and hygiene.
17. Explain the air pollution and water pollution.