



**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST**

(Autonomous & Residential)

[Affiliated to Madurai Kamaraj University]

**B.Sc. (Maths / Chem.)** Degree (Semester) Examinations, April 2015

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

**PHYSICS – II**

Under CBCS – Credit 4

Time: **3** Hours

Max. Marks: **75**

**SECTION – A**

**Answer ALL Questions :**

**(10 × 1 = 10)**

- If the distance between two charges is doubled the electrostatic force between the charges will be  
a) four times less    b) four times more    c) doubled    d) halved
- The electric field at a point inside a charged conducting sphere is 0.  
(True / False)
- Ballistic galvanometer measures \_\_\_\_\_.
- In a straight isolated conductor carrying current the direction of the magnetic field is given by  
a) Ampere's swimming rule    b) Maxwell's cork screw rule  
c) right hand clasp rule    d) Fleming's left hand rule
- Zener diodes are operated in \_\_\_\_\_ region.
- \_\_\_\_\_ gate gives a high output whenever a low output is given to all its input terminals.  
a) NOR    b) OR    c) NAND    d) AND
- \_\_\_\_\_ is invariant under Galilean transformation.  
a) velocity    b) distance    c) acceleration    d) none of the above
- A rocket moving with the speed of light appears to be reduced to a point to a stationary observer.
- \_\_\_\_\_ discovered the nucleus of an atom.  
a) Rutherford    b) Bohr    c) J.J.Thompson    d) Roentgen
- X-rays are electromagnetic waves of short wavelengths in the range of \_\_\_\_\_ to \_\_\_\_\_.

### **SECTION – B**

**Answer ALL Questions :**

**(5 × 7 = 35)**

11. a) Derive an expression for the electric field due to an electric dipole at an axial point. **(OR)**  
b) Find the potential at the centre of a 1m square having charges  $q, -2q, 3q$  and  $2q$  at its corners.  $q = 1 \times 10^{-8} \text{ C}$ .
12. a) Describe the method of comparing the e.m.f of two cells using Ballistic galvanometer. **(OR)**  
b) A standard capacitor of capacitance  $0.1 \mu\text{F}$  is charged by a potential difference of 2V. It is then discharged through ballistic galvanometer which gives a linear throw of 20cm on a scale at a distance of 1m from the mirror of the B.G. Calculate the charge sensitiveness of the galvanometer.
13. a) Draw the symbol and truth table of OR gate and explain the action of the two input OR gate.  
**(OR)**  
b) i) Convert the decimal number 37 to its equivalent binary number.  
ii) Convert the binary number 11001 to its equivalent decimal number.
14. a) Derive Einstein's mass-energy relation. **(OR)**  
b) How fast would a rocket have to go relative to an observer for its length to be contracted to 99% of its length at rest.

15. a) Based on Bohr postulates, obtain the expression for the radius of  $n^{\text{th}}$  orbit for hydrogen atom.

**(OR)**

- b) Using Bohr's theory of hydrogen spectrum, calculate the circumference of the first Bohr's orbit and the linear momentum of the electron moving in that orbit. Find out the de Broglie wavelength of this electron and show how it is related to the circumference of the orbit.

### **SECTION – C**

**Answer any THREE Questions :**

**(3 × 10 = 30)**

16. Apply Gauss's law to calculate the electric field due to a uniformly charged sphere at points outside and inside the sphere.
17. Give the principle and construction of a moving coil ballistic galvanometer and derive the relation between the quantity of charge flowing through it and the throw obtained.
18. Explain how input and output characteristics of a transistor in CE connection can be determined experimentally.
19. Write Lorentz transformation equations. Using these equations explain length contraction and time dilation.
20. Describe Bragg's x-ray spectrometer method of determining wavelength of x-rays.




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

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

**THERMODYNAMICS AND STATISTICAL MECHANICS**

Under CBCS – Credit 4

 Time: **3 Hours**

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

- The effective temperature of the sun (Photosphere) is about  
 a) 6000k      b) 6000°C      c) 60000 K      d) 60000°C
- Lorentz number  $L =$  \_\_\_\_\_.  
 a)  $\frac{k}{\sigma T} = \text{const}$     b)  $\frac{\sigma k}{T} = \text{const}$     c)  $\frac{\sigma T}{K} = \text{Const}$     d)  $\frac{KT}{\sigma} = \text{const}$
- According to Vander Waals Gas Equation, critical coefficient  $\frac{RT_c}{P_c V_c}$  is equal to  
 a) 8      b)  $\frac{8}{3}$       c) 8.3      d)  $\frac{3}{8}$
- The temperature at which Joule Thomson effect changes its sign is called  
 a) Temperature of inversion      b) Neutral Temperature  
 c) Absolute Zero Temp      d) All of the above
- First law of thermodynamics based on the law of \_\_\_\_\_.  
 a) conservation of energy      b) conservation of mass  
 c) conservation of temperature      d) conservation of momentum
- When the system undergoes adiabatic process, the entropy remains the same. (True / False)
- According to M.B.statistics, the number of particles in the given energy range is given by  
 a)  $n_i = \frac{g_i}{e^{\alpha + \beta E_i}}$     b)  $n_i = \frac{g_i}{e^{\alpha + \beta E_{i-1}}}$     c)  $n_i = \frac{g_i}{e^{\alpha + \beta E_{i+1}}}$     d)  $n_i = \frac{g_i}{e^{\alpha + \beta E \pm 1}}$

8. Phase – space is \_\_\_\_\_ space.  
 a) 1 – dimensional                      b) 3-dimensional  
 c) 4-dimensional                      d) 6-dimensional
9. Pauli’s exclusion principle is obeyed by \_\_\_\_\_,  
 a) particle with zero spin                      b) bosons  
 c) fermions                      d) particle with integral spin or half integral spin
10. If the number of collision is N total path traveled in these collisions is S then mean free path is equal to  
 a)  $\frac{S}{N}$                       b) SN                      c)  $\frac{N}{S}$                       d)  $\frac{1}{SN}$

### **SECTION – B**

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

11. a) Deduce Newton’s law of cooling from Stefan’s law.  
 (OR)  
 b) Calculate the radiant emittance of a black body at a temperature of  
 i) 400k                      ii) 4000k
12. a) Describe Linde’s process of liquefaction of air.  
 (OR)  
 b) Calculate the van der waals constants for dry air given that  
 $T_c = 132k$ ,  $P_c = 37.2$  atmosphere.  
 $R \text{ Per mole} = 82.07 \text{ cm}^3 \text{ atm} \text{ K}^{-1}$ .
13. a) State and explain Kelvin and clausius statement of second law of thermodynamics.  
 (OR)  
 b) A carrot’s engine is operated between two reservoirs at temperature of 450k and 350k. If the engine receives 1000 calories of heat from the source in each cycle, calculate the amount of heat rejected to the sink in each cycle. Calculate the efficiency of the engine and the work done by the engine in each cycle (1 calorie = 4.2 Joules).

14. a) Apply Maxwell Boltzmann distribution law to an ideal gas.

**(OR)**

- b) Write down probability theorems in statistical thermo dynamics.

15. a) Compare the basic postulates of M.B, B.E. and F.D statistics.

**(OR)**

- b) Write a short note on photon gas.

### **SECTION – C**

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

16. Derive an expression for energy distribution in a black body spectrum.
17. Discuss briefly the theory of Porous plug experiment.
18. Write a note on the following:  
 i) Adiabatic process                      ii) Isothermal process  
 iii) Isochoric process                      iv) Isobaric process
19. Obtain an expression for Maxwell – Boltzmann distribution law.
20. Obtain an expression for Base – Einstein distribution law.




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

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

**ELECTROMAGNETISM**

Under CBCS – Credit 4

 Time: **3** Hours

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

- The magnitude of  $\frac{1}{4\pi\epsilon_0}$  is  
 a)  $9 \times 10^9$       b)  $9 \times 10^{-9}$       c)  $8.85 \times 10^{-12}$       d)  $8.85 \times 10^{12}$
- Relative permittivity is defined as the ratio of the permittivity of the medium to that of free space. (True / False)
- Practical unit for measuring potential difference is \_\_\_\_\_.
- The energy of charged capacitor is  
 a)  $CV^2$       b)  $CV$       c)  $\frac{1}{2}CV^2$       d)  $\frac{1}{2}CV^2$
- The reciprocal of the conductivity is called the \_\_\_\_\_.
- For measuring potential difference \_\_\_\_\_ is used.  
 a) Potentiometer      b) ammeter      c) voltmeter      d) galvanometer
- Ballistic galvanometer is used to measure electric current. (True / False)
- \_\_\_\_\_ is placed inside a rectangular coil to produce radial field.
- RMS value of a A.C emf is  
 a)  $\sqrt{2E_0}$       b)  $\frac{E_0}{\sqrt{2}}$       c)  $\frac{E_0}{2}$       d)  $\frac{E_0^2}{\sqrt{2}}$
- Choke coil is used to control the \_\_\_\_\_ in an a.c circuit.

### **SECTION – B**

**Answer ALL Questions :**

**(5 × 7 = 35)**

11. a) State and Prove Gauss's law.

**(OR)**

b) ABCD is a square of 4cm side. Charges of  $16 \times 10^{-9}$ ,  $-16 \times 10^{-9}$  and  $32 \times 10^{-9}$  C are placed at the points A, C and D respectively. Find intensity of electric field at point B.

12. a) Derive an expression for the combined capacitance of three capacitors connected in i) series ii) parallel

**(OR)**

b) Two charges +q and -3q are separated by a distance of 1m. At what points on its axis is the potential zero?

13. a) Prove the equation of continuity and what is its significance?

**(OR)**

b) A copper wire of diameter of 0.5 mm and length 20m is connected across a battery of emf 1.5V and internal resistance  $1.25\Omega$ . Calculate the current density in the wire and drift velocity  $v_d$ , assuming one conduction electron per atom of copper. What is the heat dissipated per metre of the wire??

14. a) Calculate the value of the torque on a current loop in a uniform magnetic field.

**(OR)**

b) A square coil of side d carries current I. Calculate the magnetic induction at the centre of the coil.

15. a) Explain the principle, construction and working of a dc dynamo.

**(OR)**

b) An alternating voltage of 10V at 100Hz is applied to a choke of inductance 5H and of resistance  $200\Omega$ . Find the power factor of the coil and the power absorbed.

### **SECTION – C**

**Answer any THREE Questions :**

**(3 × 10 = 30)**

16. Derive expressions for the electric field at a point on the

a) axial line      b) equatorial line due to an electric dipole

17. Obtain an expression for the capacitance per unit length of a capacitor consisting of two coaxial cylinders.

18. Explain the principle of potentiometer. How will you use it to calibrate an ammeter and an voltmeter?

19. Give the theory, construction and working of moving coil galvanometer. How is the damping correction made?

20. Derive an expression for current in a series LCR circuit. Obtain the condition for resonance on such a circuit.




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

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

**ELECTRONICS AND COMMUNICATION – I**

Under CBCS – Credit 5

 Time: **3** Hours

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

1. The leakage of current in a crystal diode is due to \_\_\_\_\_.  
 a) Majority carriers                      b) Junction transistor  
 c) Junction capacitor                      d) Minority carriers
2. A Zener diode is always connected in \_\_\_\_\_ bias.
3. A JFET is also called \_\_\_\_\_ transistor.
4. To get highest power gain, one should use \_\_\_\_\_ configuration.  
 a) CC                      b) CB                      c) CE                      d) CC & CB
5. The point of intersection of D.C and A.C load lines is called \_\_\_\_\_.  
 a) saturation point                      b) cut off point  
 c) operating point                      d) breakdown point
6. In transistor amplifier we use stepdown transformer for impedance matching. (True / False)
7. An oscillator differs from an amplifier because it require no input signal. (True / False)
8. An ideal op Amp, has \_\_\_\_\_.  
 a) Infinite  $A_v$     b) infinite  $R_i$     c) Zero  $R_o$     d) All the above
9. For a given carrier wave, maximum undistorted power is transmitted when value of modulation is \_\_\_\_\_.  
 a) 1                      b) 0.8                      c) 0.5                      d) 0
10. In FM, when frequency deviation is doubled  
 a) modulation is doubled                      b) modulation is halved  
 c) carrier swing is halved                      d) modulation index is decreased

### **SECTION – B**

**Answer ALL Questions :**

**(5 × 7 = 35)**

11. a) Describe the action of following filter circuits

- i) capacitor filter                  ii) choke input filter

**(OR)**

b) A halfwave rectifier is used to supply 50V dc to a resistive load of  $800\Omega$ . The diode has no resistance of  $25\Omega$ . Calculate ac voltage required.

12. a) Draw the circuit of a practical single state transistor amplifier. Explain the function of each component.

**(OR)**

- b) i) A JFET has the following parameters  $I_{DSS} = 32\text{mA}$ ,  $V_{GS(\text{off})} = -8\text{V}$ ,  $V_{GS} = -4.5\text{V}$ . Find the value of drain current.  
ii) AJFET has a drain current of 5mA. If  $I_{DSS} = 10\text{mA}$  and  $V_{GS(\text{off})} = -6\text{V}$ , find the value of  $V_{GS}$  and  $V_P$ .

13. a) A transistor used potential divider method of biasing

$R_1 = 50\text{k}\Omega$ ,  $R_2 = 10\text{k}\Omega$  and  $R_3 = 1\text{k}\Omega$ . If  $V_{ce} = 12\text{V}$ ,

Find i) the value of  $I_C$  given  $V_{BE} = 0.1\text{V}$

ii) the value of  $I_c$  given  $V_{BE} = 0.3$

**(OR)**

b) What do you understand by dc and ac load lines?

How will you construct them on the output characteristics?

14. a) With the neat diagram discuss the circuit operation of Colpitt's oscillator.

**(OR)**

b) A phase shift oscillator uses 5PF capacitors. Find the value of R to produce a frequency of 800 KHZ.

15. a) Draw the diode detector circuit and explain its action.

**(OR)**

b) A 25MHZ carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 4V and the maximum frequency deviation is 10KHZ, Write down the voltage equation of the FM wave.

### **SECTION – C**

**Answer any THREE Questions :**

**(3 × 10 = 30)**

16. What is zener diode? Explain how it acts as a voltage stabiliser?

17. Draw the output characteristics of JFET and explain the

following terms used in JFET i) shorted – gate drain current

ii) pinch off voltage                  iii) Gate – source cut off voltage

18. Explain the transistor RC coupled amplifier.

19. Derive an expression for the voltage gain of inverting amplifier.

20. Define amplitude modulation. Derive the voltage equation and total power of an AM wave.






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

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

**PROGRAMMING IN C**

Under CBCS – Credit 5

 Time: **3** Hours

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

1. \_\_\_\_\_ is a data name that may be used to store a data value.  
 a) Data                      b) Pointer                      c) Memory                      d) Variable
2. The size of double data type is \_\_\_\_\_.  
 a) 16 bits                      b) 32 bits                      c) 8 bits                      d) 64 bits
3.  $(14\% - 3)$  is \_\_\_\_\_.  
 a) 2                              b) -2                              c) 52                              d) 11
4. Find the value of a, where  $a = \frac{(\text{int})21.2}{(\text{int})4.2}$ .  
 a) 2                              b) 5.25                              c) 5.04                              d) 5
5. \_\_\_\_\_ is an unconditional branching statement.  
 a) Goto                              b) Switch                              c) While                              d) If
6. While statement is \_\_\_\_\_ controlled loop statement.  
 a) a multiple                      b) an entry                      c) an exit                      d) all the above
7. Maximum of \_\_\_\_\_ elements can be stored in memory,  
 for the array declaration  $\text{int}[3][3]$ .  
 a) 9                              b) 6                              c) 3                              d) n

8. \_\_\_\_\_ is a function which calls itself.  
a) recursion      b) void      c) main      d) recall
9. \_\_\_\_\_ is a mechanism for packing different data types.  
a) matrix      b) array      c) structure      d) pointer
10. \_\_\_\_\_ is a derived data type in C.  
a) pointer      b) integer      c) float      d) double

### **SECTION – B**

**Answer ALL Questions :**

**(5 × 7 = 35)**

11. a) Give the basic Structure of a C program.  
(OR)  
b) Discuss in detail about the primary data types in C.
12. a) Explain the following with suitable examples. (3 + 4 Marks)  
i) Bitwise operator      ii) Increment and decrement operator  
(OR)  
b) Give the syntax and usage of any 7 mathematical functions with suitable examples.
13. a) Discuss the rules and syntax to be followed for FOR Statement with suitable examples.  
(OR)  
b) Summarize the rules to be followed to use switch - case statement.

14. a) Explain how 2D arrays can be declared and initialized?  
Give suitable examples.

**(OR)**

- b) List down the various categories of functions and explain any one of them.
15. a) Write about structure declaration, initialization and accessing its member.  
(OR)  
b) Write about initialization of pointer variables.

### **SECTION – C**

**Answer any THREE Questions :**

**(3 × 10 = 30)**

16. Write a C program to find the biggest among the three numbers.
17. Write a C program to check whether a given number is prime or not.
18. Write a C program to sort the given numbers in Ascending order.
19. Write a C program to find the Factorial of a given number using Recursion.
20. Write a C program to add two matrices.




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

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

**NUCLEAR PHYSICS**

Under CBCS – Credit 4

 Time: **3 Hours**

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

- The size of the nucleus is of the order of  
 a)  $10^{-8}m$                       b)  $10^{-10}m$                       c)  $10^{-14}m$                       d)  $10^{-28}m$
- The liquid drop model was proposed by \_\_\_\_\_.
- $\gamma$ -rays are  
 a) Singly ionized gas atoms                      b) helium nuclei  
 c) fast moving electrons                      d) electromagnetic waves
- \_\_\_\_\_ is the reciprocal of decay constant of a radioactive substance.  
 a) mean life                      b) half life  
 c) total life                      d) rate of disintegration
- Radio-sodium can be obtained by bombarding  $Mg^{24}$  with  
 a) protons                      b) neutrons                      c) deuterons                      d) electrons
- Mean life of free neutrons, before they are captured by a nuclei, is short as compared with their half-life. (True / False)
- The reactions taking place in solar and stellar atmosphere are \_\_\_\_\_ reactions.  
 a) thermonuclear                      b) ionic                      c) covalent                      d) fission
- Ideally moderators have high atomic weight. (True / False)
- All particles heavier than nucleons are called  
 a) Hadrons                      b) hyperons                      c) leptons                      d) positrons
- \_\_\_\_\_ law states that the velocity of recession of a galaxy is directly proportional to its distance from the earth.

### **SECTION – B**

**Answer ALL Questions :**

**(5 × 7 = 35)**

11.a) Explain the principle and working of Wilson cloud chamber.

**(OR)**

b) Alpha particles of energy 5 MeV pass through an ionization chamber at the rate of 10 per second. Assuming all the energy is used in producing ion pairs calculate the current produced (35 eV is required for producing an ion pair and  $e = 1.6 \times 10^{-19} C$ )

12.a) Define decay constant and mean life of a radioactive element.

Find the relation between them.

**(OR)**

b) Calculate the time required for 10% of a sample of thorium to disintegrate. Assume the half life of thorium to be  $1.4 \times 10^{10}$  years.

13.a) Write an essay about the applications of radio isotopes.

**(OR)**

b) The Q value of the  $Na^{23}(n,\alpha)F^{20}$  reaction is -5.4 MeV.

Determine the threshold energy of the neutrons for this reaction.

14.a) Explain the principle and action of an atom bomb.

**(OR)**

b) A reactor is developing energy at the rate of  $32 \times 10^6 W$ .

How many atoms of U-235 undergo fission per second?

Assume that on the average an energy of 200 MeV is released per fission.

15.a) Write a note on particles and antiparticles.

**(OR)**

b) Discuss about the fundamental interactions between elementary particles.

### **SECTION – C**

**Answer any THREE Questions :**

**(3 × 10 = 30)**

16. Describe the construction and working of betatron with diagram.

17. Describe with a neat diagram an experiment to determine wavelength of gamma rays. Show with reasons that gamma rays originate from the nucleus.

18. Write a note on the classification of neutrons and neutron sources.

19. Write an essay on nuclear fusion.

20. Discuss about the composition of hadrons according to the Quark model.





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

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

**CLASSICAL MECHANICS, QUANTUM MECHANICS &  
THEORY OF RELATIVITY**

Under CBCS – Credit 5

Time: **3** Hours

Max. Marks: **75**

**SECTION – A**

**Answer ALL Questions :**

**(10 × 1 = 10)**

- The constraints are non- holonomic in \_\_\_\_\_.  
 a) Simple pendulum                      b) A particle sliding down a plane  
 c) The motion of a particle placed on the surface of the sphere  
 d) Bead moving on a circular wire
- The equation of motion of a simple pendulum, by using  
 lagrangian method is  $\ddot{\theta} + \frac{g}{l} \sin \theta = 0$ . (True / False)
- Phase space is the  
 a) Momentum space                      b) Configuration space  
 c) Superposition of position and momemtum space  
 d) four dimensional Minowski space
- The Hamiltonion is defined as  
 a)  $H = \sum_K p_k \dot{q}_k + L$                       b)  $H = \sum_K p_k \dot{q}_k - L$   
 c)  $H = \sum_K q_k \dot{\theta}_k - L$                       d)  $H = \sum_K q_k p_k - L$
- For a non-relativistic free particle the phase velocity is half of  
 the group velocity. (True / False)
- The allowed energy values of a particle in box of length L are  
 given by \_\_\_\_\_.  
 a)  $\frac{n^2 \pi^2 \hbar^2}{mL^2}$       b)  $\frac{n^2 \pi^2 \hbar^2}{2mL^2}$       c)  $\frac{\pi^2 \hbar^2}{2mL^2 n^2}$       d)  $\frac{n\pi \hbar}{2mL}$

7. The expectation value of energy is  $\langle E \rangle = \int \psi^* \left( \frac{\hbar}{2} \nabla \right) \psi dj$ .  
(True / False)

8. The energy levels of Harmonic Oscillator according to Schrodinger's equation is

- a)  $n\hbar\omega$       b)  $n + \frac{1}{2}\hbar\omega$     c)  $\frac{\hbar\omega}{n^{1/2}}$       d)  $\frac{n^2 - 1}{\hbar\omega}$

9. When the velocity of a particle approaches the velocity of light, its relativistic mass becomes \_\_\_\_\_.

- a) zero      b)  $m_o$       c)  $2m_o$       d) infinity

10. The rest mass of electron is  $m_o$  when it moves with speed  $0.6c$  its mass is \_\_\_\_\_.

- a)  $m_o$       b)  $\frac{5}{4} m_o$       c)  $\frac{4}{5} m_o$       d)  $2m_o$

### SECTION – B

Answer ALL Questions :

(5 × 7 = 35)

11. a) State and explain D'Alembert's principle. (OR)  
b) Obtain the lagrangian equation of motion for Atwood's Machine.
12. a) Derive Hamilton's canonical equations of motion.

(OR)

b) Find the Hamilton's equation of motion for compound pendulum  $L = \frac{1}{2} I \dot{\theta}^2 + mgl \cos \theta$ .

13. a) Calculate the values of the energy of a particle in a one dimensional box.

(OR)

b) Calculate the de Broglie wavelength of an  $\alpha$ -particle accelerated by a P.D of 25,000 volts.

14. a) Derive Schrodinger's time dependent equation. (OR)

b) Calculate the expectation value  $\langle P_x \rangle$  of the momentum of a particle trapped in a one dimensional box.

15. a) Obtain Einstein's mass energy relation. (OR)

b) An electron is moving with a speed of  $0.85c$  in a direction opposite to that of a moving photon. Calculate the relative velocity of the photon with respect to the electron.

### SECTION – C

Answer any THREE Questions :

(3 × 10 = 30)

16. Obtain the Lagrange's equation of motion using D'Alembert's principle for conservative system.
17. Deduce Hamilton's canonical equations of motion in different co-ordinate systems.
18. Describe the construction and working of a Davisson Germer experiment with neat diagram.
19. Explain in detail about the Schrodinger's equation for the hydrogen atom.
20. Obtain an expression for variation of mass with velocity.




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

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

**HOUSEHOLD APPLIANCES**

Under CBCS – Credit 2

 Time: **2 Hours**

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

- A regulated power supply is one that controls the output of
  - voltage or current
  - amplitude
  - frequency
  - none of the above
- The term AC stands for \_\_\_\_\_.
- The frequency of DC is
  - zero
  - 40 Hz
  - 60 Hz
  - none of the above
- The transformer works on the principle of electromagnetic induction. (True / False)
- Which material is one whose electrical properties lie in between those of insulators and good conductors
  - semiconductor
  - insulator
  - capacitor
  - resistance
- Electric heating is any process in which electrical energy is converted in to \_\_\_\_\_.
- The LED's operate at low voltages i.e., from 1.5 V to 2.5 V. (True / False)
- The life time of fluorescent tube is
  - 1000 hours
  - 10,000 hours
  - 100 hours
  - none of the above
- The industrial immersion heaters may be rated at
  - 10 Kilowatts
  - 20 Kilowatts
  - 50 Kilowatts
  - 100 Kilowatts or more
- The most common material nichrome is used in
  - iron box
  - fan
  - both a and b
  - none of the above

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

- a) Define the term AC supply. Explain two phase and three phase supply

**(OR)**

- Discuss the concept of stabilized power supply.

- a) Write down the theory of transformer and its uses.

**(OR)**

- Comparison chart of Alternating current and Direct current.

- a) Explain the working principle of Light Emitting Diode (LED).

**(OR)**

- Comparison of fluorescent tube and filament lamp.

- a) Explain the phenomenon of electric heaters.

**(OR)**

- Give a brief note on geyser water heater and instant water heater.

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

- What is earthing? Write down the two types of earthing? Explain it with a neat diagram.
- Describe the construction, working principle and use of the incandescent lamps.
- With a neat diagram describe the various parts and working principle of an electric iron box.




**VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST**

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

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

**ENERGY SCIENCE – II**

Under CBCS – Credit 2

 Time: **2 Hours**

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

- Direct conversion of solar energy in to electrical energy is involved in
  - solar still
  - solar photovoltaic conversion
  - wind mill
  - solar pond
- Solar cells are used in space applications in order to
  - reduce the cost of power generation
  - reduce the total weight of the satellite
  - increase the life period
  - all the above
- The temperature attained is more than 1000°C in a
  - solar air heater
  - solar water heater
  - solar pond
  - solar furnace
- In wind mills, energy conversion taking place from
  - kinetic to electrical
  - kinetic to mechanical
  - mechanical to electrical
  - kinetic to mechanical to electrical
- The box type solar cooker is an example of solar device for
  - low temperature applications
  - medium temperature applications
  - high temperature applications
  - all temperatures
- Salt water can be converted in to potable water in
  - Solar Pond
  - Solar Distillation
  - Solar Water Heater
  - Solar Cells
- A wind mill generates electricity throughout the year. (True / False)
- The most commonly used type of wind mill for power generation is vertical axis type wind mill. (True / False)

9. Hydrogen and Oxygen gases are used in \_\_\_\_\_ cells.

10. ISRO stands for \_\_\_\_\_.

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

- What are the advantages and disadvantages of solar cooking?  
(OR)
- What are the advantages and disadvantages of solar photovoltaic conversion?
- Obtain an expression for the power from the wind?  
(OR)
- What are the advantages and disadvantages of wind energy?
- Explain in detail the various applications of Solar Furnaces.  
(OR)
- Explain the various applications of solar photovoltaic system.
- Write in detail about the Commercial or Conventional Energy Sources and their availability.  
(OR)
- What is a fuel cell? Explain briefly the working of a hydrogen-oxygen fuel cell.

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

- Describe the construction and working of a box type solar cooker.
- What is a solar furnace? With neat diagram explain the different types of solar furnaces.
- Describe the different types of horizontal axis wind mills and their conversion efficiency.






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

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

**OPTO ELECTRONICS – II**

Under CBCS – Credit 2

 Time: **2 Hours**

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

1. For single mode fibers, average loss is \_\_\_\_\_ at 1.3  $\mu\text{m}$ .  
 a) 0.6dB/km    b) 0.2dB/km    c) 0.7dB/km    d) 0.9dB/km
2. To distribute optical signals from one to many or many to one, the device is called  
 a) Optical coupler    b) multiplexer    c) encoder    d) de-multiplexer
3. Attenuation for an ideal fiber is  
 a) 0 dB    b) 0.2 dB    c) 0.154 dB    d) none of the above
4. The numerical aperture of a fiber fabricated by internal CVD process is  
 a) 0.2    b) 0.5    c) 1.0    d) 0.6
5. The number of channels( $N_c$ ) is given by the equation for ADM  
 a)  $4d_c\theta_c/\lambda$     b)  $3d_c\theta_c/\lambda$     c)  $2d_c\theta_c/\lambda$     d)  $d_c\theta_c/\lambda$
6. In Phasil system \_\_\_\_\_ glass is used.
7. Fiber losses are expressed in \_\_\_\_\_.
8. Urbach's rule for absorption loss is  $\alpha_{uv} =$ \_\_\_\_\_.
9. A simplex system requires only a single transmitter and a single receiver module per channel. (True / False)
10. Scattering loss in optical fiber varies with wavelength as  $1/\lambda^4$ . (True / False)

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

11. a) Explain the axial vapour deposition process.  
 (OR)  
 b) What are the causes for attenuation of optical fibers?
12. a) Explain the Rayleigh scattering losses in optical fiber.  
 (OR)  
 b) Describe the external chemical vapour deposition process.
13. a) Write short note on multi element glasses and phasil system.  
 (OR)  
 b) Explain the beam splitting directional coupler.
14. a) Explain the Satellite link of an optical fiber communication.  
 (OR)  
 b) Explain the transmitter for fiber optic communication.

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

15. Describe the external chemical vapour deposition processes and its characteristics.
16. Explain the Trans impedance and High impedance types of fiber optic receiver.
17. Explain the different bending losses.




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

Part – IV : Skill Based Subject : Sixth Semester : Paper – II

**PHYSICS FOR COMPETITIVE EXAMINATIONS**

Under CBCS – Credit 2

 Time: **2 Hours**

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

32. The measured value of  $\epsilon_0$  the permittivity of free space is  
 a)  $8.85418 \times 10^{-12} \text{ C}^2\text{N}^{-1}\text{m}^{-2}$     b)  $8.85418 \times 10^{-10} \text{ Fm}^{-1}$   
 c)  $8.85418 \times 10^{-9} \text{ C}^2\text{N}^{-1}\text{m}^{-2}$     d)  $8.85418 \times 10^{-11} \text{ Nm}^{-2}$
33. The path followed by a unit positive charge in an electric field is called  
 a) Newton's force    b) Gravitational force  
 c) lines of force    d) Viscous force
34. Which one of the following is an irreversible effect?  
 a) Seeback effect    b) Peltier effect  
 c) Thomson effect    d) Joule effect
35. The process by which a liquid is decomposed into ions is called  
 a) Electrolysis    b) Electrolyte    c) Electrode    d) Electrons
36. The S.I. unit of Self Inductance is  
 a) Weber/m<sup>2</sup>    b) Henry    c) Tesla    d) coulomb
37. The Transformers which convert high voltages to low voltages are called  
 a) Step up transformers    b) Step down transformers  
 c) RF transformers    d) Impedance transformers
38. "No two electrons in an atom exist in the same quantum number state", the principle stated by  
 a) Heisenberg uncertainty principle    b) Pauli exclusion principle  
 c) Bohr Principle    d) Rutherford Atom Model
39. X-rays are produced by  
 a) Coolidge tube    b) Vacuum tube    c) metal tube    d) All of the above
40. Which instrument is used to measure the sound under water?  
 a) Hygrometer    b) Hygroscope    c) Hypsometer    d) Hydrophone
41. What is unit of astronomical distance?  
 a) light year    b) angstrom    c) Weber    d) flux
42. Which are primary colors?  
 a) Yellow, green, Blue    b) Red, Magenta, Blue  
 c) Red, Green, White    d) Red, Green, blue
43. Surface tension mainly arises due to  
 a) Gravitational force    b) electrostatic force  
 c) Cohesive molecular force    d) adhesive molecular force

1. The dimensional formula for angular momentum is  
 a)  $\text{ML}^2\text{T}^{-2}$     b)  $\text{ML}^2\text{T}^{-1}$     c)  $\text{MLT}^{-1}$     d)  $\text{M}^0\text{L}^2\text{T}^{-2}$
2. A rocket or jet engine works on the principle of conservation of  
 a) linear momentum    b) angular momentum    c) energy    d) mass
3. In an adiabatic process \_\_\_\_\_ remains constant  
 a) Pressure    b) volume    c) temperature    d) temperature does not
4. The order of wavelength of X-rays is  
 a)  $10^{-10}\text{m}$     b)  $10^{-9}\text{m}$     c)  $10^{-12}\text{m}$     d)  $10^{-14}\text{m}$
5. The dimensional formula for Gravitational constant  
 a)  $\text{M}^1\text{L}^3\text{T}^{-2}$     b)  $\text{M}^{-1}\text{L}^3\text{T}^{-2}$     c)  $\text{M}^{-1}\text{L}^{-3}\text{T}^{-2}$     d)  $\text{M}^1\text{L}^{-3}\text{T}^2$
6. Which one of the following is a vector quantity?  
 a) Distance    b) temperature    c) Mass    d) Momentum
7. Newton's first law of motion gives the concept of \_\_\_\_\_.  
 a) energy    b) work    c) momentum    d) inertia
8. Which of the following objects does not belong to the solar system?  
 a) comets    b) nebulae    c) Asteroids    d) Planets
9. Rainbow is formed due to the phenomenon of  
 a) Refraction and absorption    b) dispersion and focusing  
 c) refraction and scattering    d) dispersion and total internal reflection
10. A CRO is used to measure  
 a) Voltage    b) frequency    c) phase    d) all of the above

11. The inverter is  
a) AND gate    b) OR gate    c) NOT gate    d) NAND gate
12. In Boolean algebra, the dot sign (.) indicates  
a) AND gate    b) OR gate    c) NOT gate    d) NAND gate
13. The best instrument for the accurate measurement of e.m.f. of a cell is  
a) Voltmeter    b) an ammeter  
c) a potentiometer    d) wheat stones bridge
14. The retro rocket is used to  
a) Keep a satellite in orbit  
b) change the course, away from the earth  
c) increase the velocity of a satellite  
d) decrease the velocity of a satellite
15. Nuclear force is  
a) Short range repulsive force    b) long range repulsive force  
c) Short range attractive force    d) long range attractive force
16. The candela is the unit of \_\_\_\_\_.  
a) Luminous intensity    b) Viscosity  
c) Angular momentum    d) None of the above
17. In which year Microprocessor invented?  
a) 1970    b) 1971    c) 1972    d) 1973
18. One watt hour is equal to  
a)  $3.6 \times 10^2$  joule    b)  $6.3 \times 10^2$  joule  
c)  $3.6 \times 10^3$  joule    d)  $3.6 \times 10^{-2}$  joule
19. The dimensional formula for pressure  
a)  $M^1L^{-1}T^{-2}$     b)  $ML^1T^2$     c)  $M^{-1}L^{-2}T^1$     d)  $M^2L^{-2}T^{-1}$
20. A multiplexer is also known as  
a) decoder    b) data selector    c) counter    d) none of the above
21. A full adder consists of  
a) Two half adders cascaded together  
b) two half adders and one AND gate  
c) two NAND gates    d) two half adders and one OR gate
22. Radiation emitted by the sun are  
a) Electromagnetic waves    b) ultraviolet rays  
c) Infrared rays    d) all of the above
23. The distance between the sun and the earth is known as astronomical unit. Then one Angstrom unit is equal to  
a)  $6.980 \times 10^{10}$  m    b)  $4.964 \times 10^{11}$  m  
c)  $1.496 \times 10^{11}$  m    d)  $5.420 \times 10^{11}$  m
24. Accelerated frames are called  
a) Inertia frame    b) Non Inertia frame  
c) Gaussian frame    d) none of the above
25. Who propounded the special theory of relativity  
a) Albert Einstein    b) Rutherford    c) Roentgen    d) Galilean
26. 1 Unified mass unit = \_\_\_\_\_.  
a)  $1.66 \times 10^{-27}$  kg    b)  $1.66 \times 10^{-24}$  kg  
c)  $66.1 \times 10^{-27}$  kg    d)  $1.66 \times 10^{-32}$  kg
27. The method is used to determine the thermal conductivity of poor conductors  
a) Forbes Method    b) Lees Method  
c) Lee and Charlton's method    d) None
28. In an isobaric process  
a) Pressure remains constant    b) volume remains constant  
c) Temperature remains constant  
d) temperature does not remain constant
29. In an isochoric process  
a) Pressure remains constant    b) volume remains constant  
c) Temperature remains constant  
d) temperature does not remain constant
30. In Quantum mechanics, the wave function is represented by the symbol  
a)  $\chi$     b)  $\varphi$     c)  $\psi$     d)  $\xi$
31. The radix (base) of octal number is  
a) 1    b) 2    c) 8    d) 10

44. Which of the following examples could be characterized as the result of surface tension?
  - a) A chip sips milk through a straw
  - b) Spilled mercury forms into small drops
  - c) Table salt is in the form of cubic crystals
  - d) The smell of frying fish permeates the house
45. The angle of contact for pure mercury and clean glass is
  - a)  $180^\circ$
  - b)  $110^\circ$
  - c)  $150^\circ$
  - d)  $130^\circ$
46. For pure water and clean glass, the angle of contact is
  - a)  $180^\circ$
  - b)  $90^\circ$
  - c)  $60^\circ$
  - d) Zero
47. Machine parts are jammed in winter due to
  - a) Increase in viscosity of the lubricant
  - b) decrease in viscosity of the lubricant
  - c) Increase in S.T. of the lubricant
  - d) decrease in S.T. of the lubricant
48. Angle of contact depends on
  - a) The nature of the light
  - b) the nature of the solid
  - c) The material which exists above the free surface of the liquid
  - d) all of the above
49. Young's modulus is defined as
  - a) The ratio of linear strain to the normal stress
  - b) The ratio of the normal stress to strain
  - c) Product of linear strain and normal stress
  - d) Square of the ratio of the normal stress to linear strain
50. Which of the following is not a unit of young's modulus?
  - a)  $\text{Nm}^{-1}$
  - b)  $\text{Nm}^{-2}$
  - c) Mega Pascal
  - d)  $\text{Dyne/cm}^2$
51. Bolometer measures
  - a) Thermal conductivity
  - b) specific heat
  - c) thermo e.m.f
  - d) heat radiations
52. Electromagnetic wave theory was proposed by
  - a) Wavelength
  - b) frequency
  - c) velocity
  - d) none of the above
53. The refractive index of material depends upon
  - a) Wavelength of light
  - b) nature of the material
  - c) temperature
  - d) all of the above

54. When light travels from one medium to another, which one of the following quantities never change?  
a) Velocity b) frequency c) wavelength d) refractive index
55. Wavelength corresponding to a photon is  $0.016\text{\AA}$ . Its energy is  
a)  $1.2375 \times 10^{13} \text{ J}$  b)  $12.3 \times 10^{-13} \text{ J}$   
c)  $0.125 \times 10^{-13} \text{ J}$  d)  $12 \times 10^{-13} \text{ J}$
56. The energy of light quanta of wavelength  $5000 \text{ \AA}$  in eV is  
a)  $2.48\text{eV}$  b)  $24.8\text{eV}$  c)  $248\text{eV}$  d)  $0.248 \text{ eV}$
57. Interference of two light waves can be observed with the help of  
a) spectrometer b) photometer  
c) prism d) Michelson interferometer
58. A laser beam may be used to measure very large distances because  
a) It is unidirectional b) it is coherent  
c) it is monochromatic d) it is not absorbed
59. A Source of red light  $\lambda = 7000\text{\AA}$  produces interference through two narrow slits are spaced at a distance of  $0.01\text{cm}$ . At what distance from the slits should a screen be placed so that the first few interference fringes are spaced  $1 \text{ cm}$  apart?  
a)  $1.4 \text{ m}$  b)  $14 \text{ m}$  c)  $0.14 \text{ m}$  d)  $140 \text{ m}$
60. Two straight narrow parallel slits  $0.3\text{mm}$  apart are illuminated with monochromatic light of wavelength  $5900 \times 10^{-8} \text{ cm}$ . Fringes are observed at a distance of  $30 \text{ cm}$  from the slit. The fringe width is  
a)  $0.59 \text{ cm}$  b)  $5.9 \text{ cm}$  c)  $0.059 \text{ cm}$  d)  $0.3 \text{ mm}$
61. Light transmitted by a single Nicol crystal is  
a) Plane polarized b) unpolarised  
c) circularly polarized d) elliptically polarized
62. An air bubble inside behaves as a  
a) Convex lens b) concave lens  
c) concavo convex lens d) Plano convex lens
63. A man is unable to see objects distinctly at a distance greater than  $3\text{m}$ . He is suffering from  
a) astigmatism b) myopia c) hypermetropia d) distortion
64. An astronaut in an earth satellite will observe sky as  
a) White b) black c) deep blue d) deep red
65. Beats are result of  
a) Destructive interference of sound waves  
b) Diffraction of sound waves  
c) Constructive and destructive interference  
d) Standing waves, constructive interference
66. The phenomenon of beat is due to  
a) interference b) diffraction c) reflection d) refraction
67. Decibel is  
a) a unit of measurement of power level of sound  
b) a musical note c) Musical instrument d) none of the above
68. Bells are made of metal and not of wood, because  
a) The density of metal is greater than that of wood  
b) The thermal conductivity of metal is greater than that of wood  
c) Wood dampens vibrations while metals do not  
d) The sound is not conducted by metals but is radiated
69. Ultrasonic's can be used to determine the  
a) Compressibility of a medium b) concentration and specific heat  
c) Chemical structures of a medium d) all the above properties
70. Ultrasonic's waves are producing by utilising  
a) piezo electric effect b) peltier effect  
c) Doppler effect d) none of the above
71.  $1\text{weber/m}^2$  is equal to  
a)  $1 \text{ Gauss}$  b)  $10 \text{ Gauss}$  c)  $10^2 \text{ Gauss}$  d)  $10^4 \text{ Gauss}$
72. The susceptibility of a paramagnetic substance is  
a) Positive b) negative c) zero d) none of the above
73. All the magnetic materials lose their magnetic properties when  
a) dipped in water b) heated  
c) dipped in oil d) brought near a piece of iron
74. The average binding energy of a nucleus is  
a)  $8\text{eV}$  b)  $8\text{keV}$  c)  $8\text{MeV}$  d) None of the above
75. The path of projectile as seen from another projectile is  
a) A parabolic curve b) a straight line  
c) a circle d) a hyperbola




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

Part – IV : Skill Based Subject : Sixth Semester : Paper – III

**MEDICAL INSTRUMENTATION**

Under CBCS – Credit 2

 Time: **2 Hours**

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

- The ability of the instrument to detect even a very small change in input is called  
a) Linearity    b) Sensitivity    c) Stability    d) None of the above
- In ECG calibration signal amplitude is  
a) 1 mV    b) 1 V    c) 10 V    d) 0.5 V
- The level of consciousness can be followed by means of the  
a) ECG    b) EEG    c) EMG    d) ERG
- The concurrent use of continuous RF current for cutting and a RF wave burst for coagulation is called  
a) Fulguration    b) Desiccation    c) Hemostasis    d) Blending
- In a Ventilator, the volume of exhaled air is measured by a  
a) Spirometer    b) Nebulizer    c) Humidifier    d) All of the above
- Biomedical applications of Lasers are  
a) Diagnosis    b) Therapeutic    c) Surgery    d) All of the above
- In the case of EEG with Unipolar leads, the potential of each electrode is measured with respect to  
a) adjacent electrode    b) reference electrode  
c) forehead electrode    d) ground
- To use Gamma-ray Camera, a patient has to be injected with  
a) Barium – 131    b) Oxygen – 15    c) Nitrogen – 13    d) Carbon – 11
- The use of superconducting magnets in MRI is to obtain  
a) signals from tissues    b) high strength gradient field  
c) high RF field    d) high strength magnetic field
- Images of high resolution and high quality can be obtained from  
a) MRI    b) PET    c) both a and b    d) None of the above

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

11. a) Describe the Bio-Medical Instrument System.

**(OR)**

b) List out the factors to be considered while designing Medical Instruments.

12. a) Describe the electrical conducting system of heart with a typical ECG wave

**(OR)**

b) Explain the four types of Brain waves.

13. a) Describe the working of Rotameter.

**(OR)**

b) Explain the principle of Laser action.

14. a) Describe the working of Gamma-ray camera.

**(OR)**

b) Explain Positron Emission Tomography.

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

15. Explain Bipolar limb leads in ECG lead configuration.

16. Describe the working of Ventilator Unit with its accessories.

17. Explain MRI Instrumentation with the help of block diagram.





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

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

## CIVIL DEFENCE AND ADVENTURE TRAINING

Under CBCS – Credit 2

Time: **2 Hours**

Max. Marks: **75**

### SECTION – A

**Answer ALL Questions :**

**(10 × 1 = 10)**

- In Vishram position, the distance between two heels is  
a) 12'' b) 15'' c) 6'' d) 10''
- In tez chal the distance between cadets is  
a) 45'' b) 30'' c) 60'' d) 75''
- In ADHA Dahine mur the squad turn  
a) 45° b) 180° c) 90° d) 30°
- The word of command for THAM finishes on \_\_\_\_\_ foot in marching.  
a) left b) right c) left or right d) none of these
- A line cadet placed one behind other is called  
a) file b) Rank c) blank file d) None of these
- In MR, green color represents  
a) Reserved forest b) Cultivated area  
c) living area d) dry river
- Sequence of firing is  
a) HAT b) ATH c) HTA d) AHT
- The angle between five fingers stretched in hands method is  
a) 19° b) 12° c) 8° d) 5°
- Expand the term WT:
- Expand the term AT:

### SECTION – B

**Answer ALL Questions :**

**(4 × 10 = 40)**

11.a) What are the types of adventure training?

**(OR)**

b) Define the following terms: a) Rank b) File and c) blank file

12.a) Differentiate between 'line tor' and 'vissarjan'.

**(OR)**

b) What are the basic requirements of good firer?

13.a) What are the types of leaders?

**(OR)**

b) Write the five aims of Drill

14.a) Write the ten parts of the liquid prismatic compass.

**(OR)**

b) Explain the hand's method and clock ray method of calculation of degree.

### SECTION – C

**Answer any TWO Questions :**

**(2 × 12½ = 25)**

15. Explain the different types of section formation.

16. Explain the different types of judging distance in field graft.

17. List out important values of a good and successful leader.

