+2 Physics | **Test : 1** | **Time : 2 Hours**

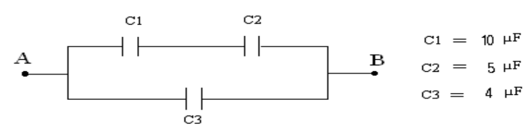
Unit - 1 Electrostatics | **Year : 2012 – 2013** | **Marks : 100**

Section : A Answer ALL the questions ***(15 X 1 = 15)***

1. The value and the unit of permittivity are ……… and ……… respectively.
2. The electric field at any point outside the two oppositely charged parallel plates is ………….
3. The principle of the lightning conductor is ………………
4. Smaller the radius of curvature of a conductor, ……………. is the surface charge density.
5. The energy stored in a capacitor is U = …………..
6. The induced dipole moment is directly proportional to the ………… field.
7. If the centre of gravities of the positive and the negative charges coincide, it is …..…… molecule.
8. The process of isolating a certain region of space from external electric field is called ………….
9. The potential at a point at a distance 3m from a point charge 9 µC is ………….
10. In an uniform electric field, equipotential surfaces are the ……….. planes.
11. The number of electric lines of force originating from a charge of 1 C is …………..
12. The electric field at any point inside a hollow charged metallic sphere is ………..
13. The capacitance of a parallel plate capacitor increases from 6 µF to 60 µF when a dielectric is filled between the plates. The dielectric constant value is ……………
14. The electric field at any point inside the two oppositely charged parallel plates is ………….
15. The unit of electric field intensity is ………….

Section : B Answer any TEN the questions ***(10 X 3 = 30)***

16. In which fields the property of attraction and repulsion between charged bodies is used ?
17. Distinguish between conductors and insulators.
18. What is an electric dipole ? Give the unit of the dipole moment.
19. What is an electric line of force ?
20. State Gauss's law.
21. What is an equipotential surface ?
22. Define the electric flux. Give its unit.
23. Why it is safer to be inside a car than standing under a tree during a lightning ?
24. Give the uses of the capacitors.
25. What is a polar molecule ? Give two examples.
26. Two charges 10×10^{-9} µC and 20×10^{-9} µC are at a distance 0.03 m. Calculate the electric potential energy.
27. What is action of points ?
28. In the given diagram, calculate the effective capacitance between A and B.



Section : C Answer any FIVE questions (Question - 33 is compulsory) ***(5 X 5 = 25)***

29. Derive an expression for the capacitance of a parallel plate capacitor with a dielectric between the plates.
30. State and explain Coulomb's Inverse square law in electrostatics.
31. Derive an expression for the torque on an electric dipole in an electric field.
32. State the properties of electric lines of forces.
33. +q and -3q are separated by 1m. At which point between the charges on its axial line the potential is zero? (OR)
    A parallel plate capacitor with air between the plates has a capacitance of 8 pF. What will be the capacitance, if the distance between the plates be reduced to half and the space between the plates is filled with a substance of dielectric constant 6 ?
34. Derive an expression for the electric potential at any point due to a point charge.
35. Derive an expression for the energy stored in a capacitor.
36. Explain the action of lightning conductor.

Section : D Answer any THREE questions ***(3 X 10 = 30)***

37. Explain the construction and the working of Van de Graaff generator.
38. Derive an equation for the electric potential at any point due an electric dipole.
39. Deduce the expressions for the equivalent capacitance of the capacitors connected in series and in parallel.
40. Derive an expression for the electric field due to an infinite long straight charged wire using Gauss's law.
41. Derive an expression for the electric field at any point on the equatorial line of an electric dipole.

!!!!!!!!! Best wishes !!!!!!!!

+2 Physics Test Number: 2 Year : 2012 - 2013 Marks : 50

UNIT : 2 CURRENT ELECTRICITY

Part – B: Answer any FIVE questions ***(5 X 3 = 15)***

1. State Ohm's law.
2. Define resistivity of a material.
3. Give the applications of the secondary cells.
4. What is the value of the red, red, red coloured carbon resistor with no ring on the other side of the resistor ?
5. Give any three uses of super conductors.
6. Distinguish between electric power and electric energy.
7. What is a wattmeter ?

Part – C : Answer any SEVEN questions. (Question number - 11 is compulsory.) ***(7 X 5 = 35)***

8. Explain the action of Lead acid accumulator.
9. Explain the principle of the potentiometer.
10. Derive the relation between current and drift velocity.
11. The effective resistances of two resistances are 10 Ω and 2.4 Ω when they are connected in series and parallel. What are the individual resistors ?

(OR)

The resistance of a coil is 50 Ω at 20^0 C and 65 Ω at 70^0 C. Find the temperature coefficient of resistance.

12. Explain the working of Leclanche cell.
13. Explain the method to find the resistance of a wire using the metre bridge.
14. Explain the method to compare the emf's of the two cells using the potentiometer.
15. State and explain Faraday's laws of electrolysis.
16. Derive condition for bridge balance of a Wheatstone's bridge.
17. Explain the construction and working of Daniel cell.

@@@@@ Best wishes @@@@@

Test Number: 3 **+2 Physics** **Year : 2012-2013** **Time : 1½ hour**

+2 Physics **Unit : 3 Effects of electric current** **Marks : 75**

Section : A Fill in the blanks ***(5 X 1 = 5)***

1. Fuse wire contains ………… % of lead and ………….. % tin.
2. At the temperature of inversion, the thermo emf is …………..
3. The torque is maximum on a current carrying coil, if the plane of the coil is …………. to the field.
4. An ideal voltmeter has ……………. resistance.
5. Magnetic moment of a current carrying loop is the product of ……….. and …………….

Section : B Answer any TEN questions. ***(10 X 3 = 30)***

6. Define: Peltier coefficient and give its unit.
7. Define: Maxwell's right hand cork screw rule.
8. Define: ampere.
9. Write a short notes on current sensitivity of a galvanometer.
10. How will you convert a galvanometer into an ammeter ?
11. What is Lorentz force? Give any two properties.
12. In a TG the deflection is 30^o for a current of 1A. Calculate the current that produces a deflection of 60^o.
13. State Biot-Savart law.
14. Define: Thomson effect.
15. Calculate the resistance of the tungsten wire of a 100W, 220V bulb.
16. The magnetic induction at a point 10 cm from a long straight current carrying conductor is 4×10^{-6} tesla. Calculate the current in the conductor.
17. What are the limitations of a cyclotron?

Section : C Answer any FOUR questions. (Question – 22 is compulsory) ***(4 X 5 = 20)***

18. Explain Positive Thomson effect.
19. Explain the conversion of galvanometer into voltmeter.
20. Derive an expression for the force on a current carrying conductor in a magnetic field.
21. Write a short notes on voltage sensitivity of a galvanometer.
22. A current of 4 A flows through 5 turns coil of a TG having a diameter of 30 cm. If the horizontal component of the earth's magnetic induction is 4×10^{-5} T, find the deflection produced in the coil. **(OR)**
    A galvanometer has a resistance of 100 ohm. A shunt resistance of 1 ohm is connected across it. What part of the total current flows through the galvanometer ?
23. Write a short notes on Thermopile.

Section : D Answer any TWO questions. ***(2 X 10 = 20)***

24. Explain the construction and the working of a moving coil galvanometer.
25. Explain the construction, working and the limitations of a cyclotron.
26. Derive an equation of the magnetic induction at a point due to an infinitely long straight conductor carrying current.
27. State and explain Joule's law of heating with an experiment.

******* Best wishes *******

Test Number :4 **+2 Physics** **Year : 2012- 2013**

UNIT : 4 Electro magnetic induction and Alternating currents Marks : 55

Part : B Answer any FIVE questions. **(5 X 3 = 15)**

1. State Lenz's law.
2. State Flemings right hand rule.
3. What is self induction ?
4. Define : the unit of coefficient of mutual inductance.
5. Define : the efficiency of a transformer.
6. Define : the rms value of an AC.
7. Define : Q factor.
8. Calculate the mutual inductance between two coils when a current of 3A changing to 8A in 0.5s in one coil, induces an emf of 50V in the other coil.

Part : C Answer any FOUR questions. (Question number 15 is compulsory) **(4 X 5 = 20)**

9. Explain the method of inducing an emf by changing the area enclosed by a coil.
10. Derive an expression for the energy associated in an inductor.
11. Explain the various forms of energy losses in a transformer.
12. Explain the construction and working of a choke coil.
13. Explain the formation of eddy currents.
14. Write a short notes on transformers.
15. A solenoid of length 1m and 0.05 m diameter has 500 turns. If a current of 2 A passes through the coil, calculate the co-efficient of self induction of the coil.

(OR)

A transformer has an efficiency of 80%. It is connected to a power input at 4kW and 100 V. If the secondary voltage is 240 V, calculate the primary and the secondary currents.

Part : D Answer any TWO questions. **(2 X 10 = 20)**

16. A source of alternating emf is connected in series with a resistor, an inductor and a capacitor. Obtain the expressions for the impedance and the phase difference between the current and the voltage.
17. Explain the construction and the working of the AC generator.
18. Explain the method of inducing an emf by changing the orientation of the coil with respect to magnetic field.
19. Explain the AC circuit containing the capacitor only .

***** **Best wishes** *****

Test Number : 5 **+2 Physics** **Year : 2012 - 2013** **Marks : 50**

Unit : 5 Electromagnetic waves and wave optics

Section : B Answer any* FIVE *questions. ***(5 X 3 = 15)***

1. What are Fraunhofer lines ?
2. What is Tyndal effect ?
3. Define: wavefront.
4. State Huygen's principle.
5. Give the differences between uniaxial and biaxial crystals.
6. What is polarization ?
7. What are the uses of IR rays ?
8. State Brewster's law.

Section : C Answer any* THREE *questions. (Question number- 14 is compulsory) ***(3 X 5 = 15)***

9. Explain the construction and the working of Nicol prism.
10. Explain Young's double slit experiment.
11. Explain the corpuscular theory of light.
12. Explain Raman effect.
13. Using Huygen's principle, explain the method of obtaining the position of a new wavefront.
14. In Newton's ring experiment the diameter of the 20^{th} dark ring was found to be 5.82 mm and that of the 10^{th} ring 3.36 mm. If the radius of the plano- convex lens is 1 m. Calculate the wavelength of the light used. (OR)

    A parallel beam of monochromatic light is allowed to incident normally on a plane transmission grating having 5000 lines per centimeter. A second order spectral line is found to be diffracted at an angle 30^0. Find the wavelength of the light used.

Section : D Answer any* TWO *questions. ***(2 X 10 = 20)***

15. Explain the formation of Newton's rings with a neat theory.
16. Derive an equation for the bandwidth of interference fringes in Young's double slit experiment.
17. Explain the different types of emission and absorption spectra.
18. Explain the theory of plane transmission grating.

***** **Best wishes** *****

e – mail id : b_elangovan_phss@yahoo.co.in

Test Number : 6 **Year : 2012 – 2013** **Time : 1 ½ Hours**

+ 2 Physics **Unit : 6 Atomic physics** **Total marks : 75**

Section : A Fill in the blanks. ***(10 X 1 = 10)***

1. All the elements are made up of atoms of hydrogen. This was suggested by ……………..
2. In the case of hydrogen atom, Thomson's model gives only one spectral line of wavelength about …….
3. The radius of the n th orbit of an electron is proportional to the square of the ………… number.
4. The wavelengths of the D_1 and D_2 emission lines of sodium are ……… and ………..
5. When an electric field or magnetic field is applied to the atom, each of the spectral line is split into several lines. The former is called as ……… effect and the later is called as ………. effect.
6. Any plane containing an arrangement of atoms symmetrically in a three dimensional space is called …...
7. In characteristic X – rays, when an electron jumps from M shell to N shell, ………. line is formed.
8. In metastable states, the life time of the atoms is ………… second.
9. According to Bohr's atom model, ………… quantity takes discrete values.
10. In a ruby laser, ………….. ions absorb the green colour.

Section : B Answer any TEN questions. ***(10 X 3 = 30)***

11. State any five properties of canal rays .
12. State the drawbacks of Rutherford' s atom model.
13. Define excitation potential energy.
14. What are hard X-rays and soft X-rays ?
15. State the conditions to achieve laser action ?
16. State Moseley's law.
17. What is normal population ?
18. Give the uses of laser in medicine.
19. Calculate the minimum wavelength of X-rays produced by an X ray tube at 1000 kV.
20. The Rydberg constant for hydrogen is$1.097 X 10^{7} m^{-1}$.Calculate the shortest wavelength of Lyman series.
21. Calculate the energy of the electron in the second orbit in the hydrogen atom.
22. State the postulates of Bohr's atom model.

Section : C Answer any THREE questions.(Question number 27 is compulsory) ***(3 X 5 = 15)***

23. State and explain Bragg's law.
24. Explain the action of the Ruby laser.
25. Explain the various types of the spectral series of the hydrogen atom.
26. Explain the construction of the discharge tube.
27. Calculate the closest approach of α - particle to the copper nucleus when α – particle of 5 MeV is scattered back by a thin sheet of copper. (Z of copper is 29) (OR) Monochromatic X – rays of wavelength 1 A ^{o} when falls on a crystal, successive reflections take place at angles 30 ^{o} and 45 ^{o} respectively. Find the lattice constant of the crystal

Section : C Answer any TWO questions. ***(2 X 10 = 20)***

28. Explain J.J. Thomson's experiment to find the specific charge of an electron.
29. Explain Millikan's experiment to find the charge of an electron.
30. Derive an expression for the total energy of an electron in the n th orbit.
31. Explain the action He – Ne laser with neat diagrams.

^^^^^ **Best wishes** ^^^^^

e-mail id: b_elangovan_phss@yahoo.co.in

+2 PHYSICS Test Number : 7 Year : 2012 – 2013 Time : 1½ Hour

Unit : 7 Dual nature of radiation and matter and relativity Total marks : 75

Section : A Fill in the blanks ***(10 X 1 = 10)***

1. The maximum kinetic energy of the photo electrons is ………….. proportional to the frequency of the incident radiation.
2. Light is emitted in the form of discrete packets of energy called …………….
3. In order to get large number of photo electrons, the plate is coated with a low work function material like ……..
4. Photoelectric cells are used in the study of ……….. and …………. of stars.
5. The equation of de Broglie waves is $\lambda = 12.27 A^0 / (\ldots\ldots)^{1/2}$
6. The resolving power of an electron microscope depends on the ……… of the radiation.
7. The types of the photo electric cells are ……… , ………. , ……….
8. The special theory of relativity was formulated by ……………….
9. The stationary orbits of the electrons are those in which orbital circumference is an integral multiple of de Broglie …………..
10. The relation between the rest mass and the mass of the particle when it moves with a velocity v is …………..

Section : B Answer any TEN questions ***(10 X 3 = 30)***

11. What is photo electric effect ?
12. Define threshold frequency.
13. Define work function of a material.
14. What are photo electric cells ?
15. What are de Broglie waves ?
16. Give the uses of the electron microscope.
17. Define a frame of reference.
18. State the postulates of the special theory of relativity.
19. The rest mass of an electron is $9.1X10^{-31}$ kg.What will be its mass if it moves with $(4/5)^{th}$ of the velocity of light.
20. The work function of iron is 4.7 eV. Calculate the threshold frequency.
21. Calculate the rest energy of an electron in MeV.
22. State the limitations of using an electron microscope.

Section : C Answer any SEVEN questions (Question number -27 is compulsory) ***(7 X 5 = 35)***

23. Explain the variation photo electric current with the applied voltage.
24. Explain Einstein's theory of photoelectric effect.
25. Explain length contraction.
26. Write a short notes on time dilation.
27. The time interval measured by an observer at rest is $2.5 X 10^{-8}$ s. What is the time interval as measured by the observer moving with a velocity v = 0.73 C.

(OR)

Lithium has a work function of 2.3 eV. It is exposed to light of wavelength $4.8 X 10^{-7}$ m. Find the maximum kinetic energy with which the photoelectron leaves the surface.

28. Derive an expression for de Broglie waves.
29. Explain the construction and working of an electron microscope.
30. Derive Einstein's mass energy equivalence.
31. Explain the construction and the working of a photo emissive cell.
32. State any five uses of the photo electric cells.
33. State the laws of photoelectric emission.

&&&&& Best wishes &&&&&

e-mail id: b_elangovan_phss@yahoo.co.in

+ 2 PHYSICS Test Number : 8 UNIT : 8 NUCLEAR PHYSICS MARKS : 75

Section : A Fill in the blanks. **(10 X 1 = 10)**

1. The mass of the proton is ……….. times the mass of the electron.
2. $_{13}Al^{27}$ and $_{14}Si^{28}$ are the examples for …………
3. The nuclear force is …………. times the gravitational force.
4. The nuclear fission can be explained by ……………model.
5. The isotope used in agriculture is …………
6. The half life period of an isolated neutron is ………… minutes.
7. The HLP of N^{13} is 10.1 minutes. The mean life period is …………
8. The betatron can accelerate particles to energy in the order of …………….
9. The sun radiates the solar energy at the rate of ………… joules per second.
10. The mass of the ………. vary from 2180 m_e and 3275 m_e.

Section : B Answer any TEN questions. **(10 X 3 = 30)**

11. Define radioactivity.
12. Define one curie.
13. What is artificial radioactivity ?
14. Explain the types of neutrons.
15. What is artificial transmutation of elements ?
16. What is a breeder reactor ?
17. What are cosmic rays ?
18. Name the types of quarks. How a proton can be represented by quarks ?
19. Calculate the nuclear radius of $_{13}Al^{27}$.
20. Tritium has a half life period of 12.5 years. What fraction of the sample will be left over after 25 years ?
21. The decay constant of a radioactive sample is 0.00231 / day. Calculate the half life and mean life periods.
22. The isotope of $_{92}U^{238}$ successively undergoes three α - decays and two β -decays. What is the resulting isotope ?

Section : C Answer any THREE questions. (Question- 27 is compulsory) **(3 X 5 = 15)**

23. Explain the BE / A curve.
24. Explain Soddy-Fajan's radioactive displacement law.
25. Explain the construction and the working of Geiger-Muller counter.
26. Explain how carbon-nitrogen cycle can account for the production of stellar energy.
27. A reactor is developing energy at the rate of 32 MW. Calculate the required number of fissions per second of $_{92}U^{238}$. Assume that energy per fission is 200 MeV.

(OR)

Calculate the binding energy and the average binding energy per nucleon of $_{26}Fe^{56}$.
(Mass of $_{26}Fe^{56}$ nucleus = 55.9349 amu ; Mass of one proton = 1.007825 amu ;
Mass of one neutron = 1.008665 amu)

Section : D Answer any TWO questions. **(2 X 10 = 20)**

28. Explain the construction and the working of Bainbridge mass spectrometer.
29. Explain the construction and the working of the nuclear reactor with a neat diagram.
30. Explain the altitude and the latitude effects of cosmic rays.
31. Derive $N = N_o e^{-\lambda t}$.

***** **Best wishes** *****

e-mail id: b_elangovan_phss@yahoo.co.in

+2 Physics Test number : 9 Year : 2012-13 Time : 1½ Hours

Unit : 9 Semiconductor devices and their Applications Marks : 75

Section : A Fill in the blanks. ***(10 X 1 = 10)***

1. For an insulator, the forbidden energy gap is in the order of ……………..
2. In a PN junction diode reverse bias, the current is of the order of ………….
3. The conversion of AC into DC is called ……………….
4. The ratio of the d.c power output to the a.c power input is known as rectifier ……………
5. In a Zener diode, at a particular reverse bias voltage called …………… , the current increases enormously.
6. In a transistor, the ratio between emitter-base potential and base current is called ………….
7. The frequency interval between lower cut off and upper cut off frequencies is called ……………
8. In Colpitt's oscillator, the frequency of oscillation is given by f = ………….
9. First De Morgan's theorem is ………………….
10. OP-AMP consists of …….. transistors, ……. resistors and ……… capacitor.

Section : B Answer any TEN questions. ***(10X 3 = 30)***

11. What is meant by depletion region of PN junction diode ?
12. What are the biasing conditions to be followed in normal operation of a transistor ?
13. What is an amplifier ? Mention its properties.
14. In a common base transistor circuit $I_C = 0.97$ mA and $I_B = 30\ \mu$A. Calculate the value of α .
15. What are sinusoidal and non-sinusoidal oscillators ?
16. State Barkhausen conditions for oscillators.
17. Determine the frequency of oscillations in a Colpitt's oscillator, if $C_1 = 0.01\ \mu$ F, $C_2 = 0.03\ \mu$ F and L = 100 mH.
18. What is an integrated circuit ?
19. Distinguish between analog and digital signals.
20. Draw a circuit of OR gate using diodes.
21. What are universal gates ? Why they are called so ?
22. Prove the Boolean equation (A + B) (A + C) = A + BC .

Section : C Answer any THREE questions. ***(3 X 5 = 15)***

23. Explain the working of half wave rectifier .
24. Explain the action of OP – AMP as difference amplifier.
25. Explain N- type semiconductor.
26. Explain the working of a transistor amplifier.
27. The gain of the amplifier is 100. 5% of the output voltage is fed back into the input through a negative feedback network. Find the voltage gain after feedback .

Section : D Answer any TWO questions. ***(2 X 10 = 20)***

28. Describe the energy band structure of insulator, semiconductor and conductor.
29. Explain an experiment to determine the characteristics of a transistor in CE configuration. Explain how the transistor parameters can be evaluated ?
30. Explain the working of a Colpitt's oscillator.
31. Explain the construction and the working of a multimeter.

(((((((((**Best wishes**)))))))))

e-mail id: b_elangovan_phss@yahoo.co.in

+2 Physics Test number : 10 Year : 2012 – 13 Time : 1½ Hours

Unit : 10 Communication systems Maximum marks : 75

Section : A Fill in the blanks. ***(10 X 1 = 10)***

1. In amplitude modulation, the bandwidth is ………… times the signal frequency.
2. The purpose of dividing each frame into two fields so as to transmit 50 views of the picture per second is to ………… in the picture.
3. Printed documents to be transmitted by fax are converted into electrical signals by the process of …………
4. The long distance radio communication is possible through …………… wave propagation.
5. The factor that determines the strength and quality of the transmitted signal is called ……………..
6. A carrier wave of amplitude 10 mV is modulated by a sinusoidal audio signal of amplitude 6 mV, the modulation factor is ……………..
7. If 900 kHz station is tuned, then the frequency of the waves produced by the local oscillator is ……… kHz.
8. The number of synchronizing pulses that are used for transmission is equal to …………..
9. In a 625 line system, the horizontal frequency of scanning is equal to …………… Hz.
10. In a CCIR standards the channel width for the TV transmission is ……………….. Hz.

Section : B Answer any TEN questions. ***(10 X 3= 30)***

11. What is called skip zone ?
12. Define modulation factor.
13. What are advantages of frequency modulation ?
14. What is an antenna ?
15. Define: phase modulation.
16. Define: bandwidth.
17. What is directivity of an antenna ?
18. What is called Buffer ?
19. What is meant by scanning ?
20. What are the applications of radar?
21. What is meant by MODEM ?
22. What are the advantages of fiber optic communication system ?

Section : C Answer any THREE questions. ***(3 X 5 = 15)***

23. Explain the reflection of electromagnetic waves by the ionosphere.
24. Explain the amplitude modulation.
25. Explain the frequency modulation.
26. Write a short notes on FAX.
27. In a broadcasting studio, a 1000 kHz carrier is modulated by an audio signal of frequency range 100 – 5000 Hz. Find (i) maximum and minimum frequencies of USB, (ii) maximum and minimum frequencies of LSB and (iii) width of the channel.

Section : D Answer any TWO questions ***(2 X 10 = 20)***

28. Explain the analysis of amplitude modulated wave.
29. Explain the action of superhetrodyne AM receiver with the help of a functional block diagram.
30. Explain the function of vidicon camera tube.
31. Explain the transmission and the reception of radar signals with the help of a block diagram.

*********** Best wishes ***********

e-mail id: b_elangovan_phss@yahoo.co.in

Thanks to Thiru K.K.Devadoss Sir and Kalvisolai for giving this opportunity.

Dear Sir/ Madam/Student , if you have any suggestion or corrections to be done, please mail me to my e-mail id:

b_elangovan_phss@yahoo.co.in

Presented by :

B.ELANGOVAN.M.Sc.,M.Ed.,M.Phil.,
(Dr.Radhakrishnan State level Best Teacher Award-2011 Recipient)
Post Graduate teacher in Physics,
Pachaiyappa's Hr.Sec.School,
KANCHIPURAM – 631501.
Phone: 9444438464.