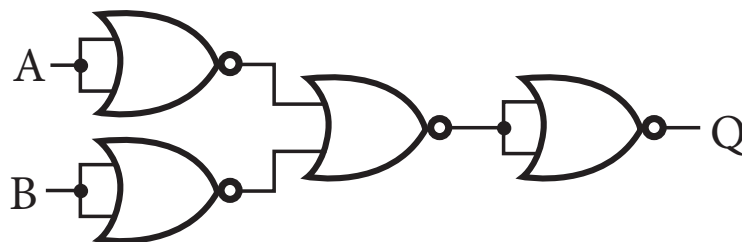




8. In Young's double slit experiment, 12 fringes are observed in a certain region of the screen when light of wavelength 600 nm is used. If the wave length of light changed as 400 nm, then the number of fringes observed in the same segment of the screen is
- a) 12                      b) 18                      c) 24                      d) 30
9. Two photons of energies twice and thrice the work function of a metal are incident on the metal surface. then the ratio of maximum velocities of the photo electrons emitted in the two cases respectively is
- a)  $\sqrt{2} : 1$                       b)  $1 : \sqrt{3}$                       c)  $\sqrt{3} : \sqrt{2}$                       d)  $1 : \sqrt{2}$
10. Anaemia can be diagnosed by
- a)  $_{15}P^{31}$                       b)  $_{15}P^{32}$                       c)  $_{26}Fe^{59}$                       d)  $_{11}Na^{24}$
11. Radio active substances x and y contain equal number of atoms initially. Half life of x and y are 1 day and 2days respectively. At the end of 2nd day and the ratio of rate of disintegration of x and y is.
- a) 1 : 2                      b) 2 : 1                      c) 1:1                      d) 1:4
12. In p - type semi conductor, there are
- a) immobile negative ions                      b) immobile positive ions
- c) no minority carriers                      d) holes as majority carriers

13. The gate shown is a



- a) OR                      b) AND                      c) EX - OR                      d) NAND
14. All medium wave signals received during the day time use
- a) Ground wave                      b) Space wave                      c) Sky wave                      d) all the above

15. In Millikan's oil drop experiment a drop of radius  $r$  and carrying a charge ' $q$ ' is held stationary between the plates at a potential difference  $V$ . Then another drop of radius  $2r$  will be stationary at a potential difference  $4V$ . It carries a charge of .

a)  $\frac{q}{2}$

b)  $2q$

c)  $4q$

d)  $\frac{q}{4}$

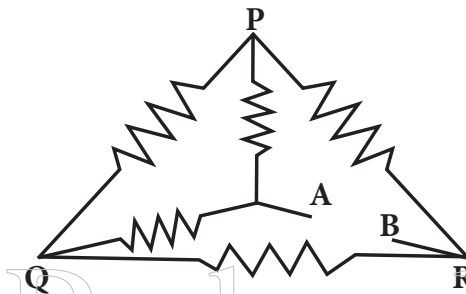
### PART - II

Answer any 6 questions in which question no : 22 is compulsory.

6x2=12

16. Define electric field Intensity.

17. If each of the resistances shown in the circuit is  $R$ . Calculate the effective resistance between terminals A and B.



18. A current carrying long straight conductor produces magnetic field of  $4 \times 10^{-8}$  T at a point 20 cm from the conductor. Calculate the current passing through the wire conductor.

19. Write the rms value of alternating current. Draw the graph for the variation of  $I^2$  with respect to time

20. Give any two characteristics of electromagnetic waves.

21. Why ordinary plane transmission gratings cannot be used to produce diffraction effects in X - rays?

22. When the energy of the incident radiation increased by 20 %, the kinetic energy of the photo electrons emitted from a metal increased from 0.5 eV to 0.8eV. Calculate the work function of the metal.

23. Define the Converse of pair production

24. Why multimeter is called as AVO meter?

**PART - III****Answer any six questions in which question No: 33 is compulsory****6x3=18**

25. What are the properties of electric lines of forces?
26. Derive an energy associated with an inductor.
27. In Young's experiment a light of frequency  $6 \times 10^{14}$  Hz is used. Distance between the centres of adjacent bright fringes is 0.75 mm. Calculate the distance between the slits, if the screen is 1.5 m away.
28. Write down any three properties of cathode rays.
29. State the laws of photo electric emission.
30. Deduce the relation between  $\alpha$  and  $\beta$  of a transistor
31. Draw circuit diagram of Colpitt oscillator.
32. What are the merits of Satellite Communication?
33. Calculate the velocity of a photo electron if the work function of a target material is 1.24eV and the wave length of incident light is  $4.36 \times 10^{-7}$  m.

**PART - IV****Answer all the questions****5 x 5=25**

34. (a) Derive an expression for the radius of the  $n^{\text{th}}$  dark ring in Newton's ring experiment  
(b) Wavelength of light in air is  $6000 \text{ \AA}$ . What will be its wavelength in a media of refractive index 1.5?

(OR)

Derive an expression for a force on a current carrying conductor placed in a magnetic field.

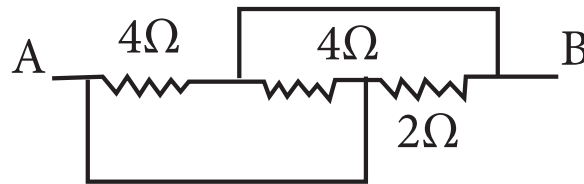
35. (a) A source of alternating emf is connected with RLC series combination circuit. Obtain with the help of vector diagram, the expression for (i) the effective voltage (ii) the phase relationship between the current and the voltage.

(OR)

(b) State Gauss Law Derive an expression for electric field due to an infinite long straight charged wire by using Gauss law.

36. (a) Derive an expression for balancing condition of Wheatstone network.

(b) Calculate the equivalent resistance between points A and B of the circuit shown



(OR)

Explain the working of Ruby laser with energy level diagram.

37. Describe the principle, construction and working of Geiger - Muller counter.

(OR)

Derive an expression for voltage gain of an amplifier with negative feed back.

38. Explain the functional block diagram of a mono chrome TV receiver.

(OR)

(a) Obtain an expression to calculate the amount of radio active substance present at any instant.

(b) The disintegration constant of a radio active element is 0.00231 per day. calculate its half life and mean life.

**HIGHER SECONDARY SECOND YEAR****PHYSICS****MODEL QUESTION PAPER-II****TIME : 2.30 HOURS****MARKS : 70****PART-I****I. CHOOSE THE CORRECT ANSWER.****15x1=15**

1. If the electric potential is constant in the given region, the electric field will be
  - a) a constant
  - b) Varying with respect to distance
  - c) Zero
  - d)  $\frac{1}{r}$  times of its potential
2. Terminal voltage across a secondary cell is equal to its emf, When
  - a) at the time of charging
  - b) at the time of discharging
  - c) no current is drawn from the cell
  - d) none of the above
3. An electric current is passing through East along a long conductor. The direction of magnetic field above the wire
  - a) towards East
  - b) towards West
  - c) towards South
  - d) towards North
4. An inductor with iron core and a bulb are connected to in series a circuit with D.C source. If an iron core is removed from an inductor, then the brightness of the bulb will.
  - a) be a same
  - b) increase
  - c) decrease
  - e) increase a moment then decreases
5. Electromagnetic waves are
  - a) transverse
  - b) produced by accelerated charges
  - c) Chargeless
  - d) all the above



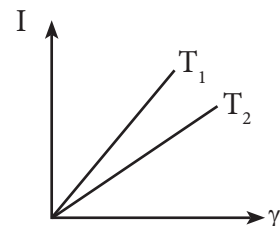
12. If the self inductance of an air core inductor increases from 0.1 mH to 20 mH on the introduction of metal core into it. The relative permeability of the core used is
- a) 200                      b) 20                      c) 2                      d) 1
13. The width of depletion region in a PN junction diode
- a) decreases when reverse bias applied
- b) increases when reverse bias applied
- c) increases when forward bias applied
- d) remains the same. irrespective of the bias voltage
14. In a common emitter amplifier, the output resistance is  $4000 \Omega$  and the input resistance is  $1 \text{ k} \Omega$ . If the peak value of the signal voltage is  $10 \text{ mV}$  and  $\beta = 50$ , then the peak value of the output voltage is
- a)  $500 \times 10^{-3} \text{ V}$                       b)  $1.25 \text{ V}$                       c)  $200 \text{ V}$                       d)  $2 \text{ V}$
15. A sinusoidal carrier voltage of  $100 \text{ V}$  is amplitude modulated by a sinusoidal voltage of frequency  $5 \text{ KHz}$  resulting in maximum modulated carrier amplitude of  $180 \text{ V}$ . The modulation factor is
- a) 1.8                      b) 1                      c) 0.8                      d) 1.6

### PART - II

Answer any six questions in which Q.No 19 is compulsory

$6 \times 2 = 12$

- 16) What is rectification?
- 17) Three point charges  $4q, Q$  and  $2q$  are placed in a straight line of length  $10 \text{ cm}$  at points distance  $0.5 \text{ cm}, 10 \text{ cm}$  respectively. If the net force on charge  $2q$  is zero, then calculate the value of  $Q$
- 18) The  $V - I$  graph for a given metallic wire at different temperatures  $T_1$  and  $T_2$  are shown. Which of the temperature  $T_1$  and  $T_2$  is greater? Give explanation.





- 19) To increase the current sensitivity of a moving coil galvanometer by 50% its resistance is increased so that the new resistance becomes twice its initial resistance. Derive By what factor does the voltage sensitivity change.
- 20) A piece of metal and non metallic stone are dropped simultaneously from the same height (near the surface of the earth) Which one will reach ground earlier? Give reason.
- 21) What are the condition for total internal reflection?
- 22) State the principle of Millikan's oil drop experiment.
- 23) Write a note on variation of mass with velocity.
- 24) Two radio active materials  $x_1$  and  $x_2$  have decay constants  $10\lambda$  and  $\lambda$  respectively. If initially they have the same number of nuclei then after what time the ratio of the number of nuclei of  $x_1$  to that of  $x_2$  will be  $1/e$ ?

### PART - III

III. Answer any six questions. Q.No : 30 is compulsory

6 x 3 = 18

- 25) Derive an expression for potential due to a point charge.
- 26) The range of a voltmeter of resistance  $300\ \Omega$  is 5V Calculate the resistance to be connected to convert it into an ammeter of range 5A?
- 27) Write a note on Nicol prism.
- 28) Explain the power losses in transformer.
- 29) State and explain Bragg's law.
- 30) A proton is moving at a speed of 0.900 times the velocity of light. Find its kinetic energy in Joules and MeV.
- 31) What are the properties of neutron?
- 32) State and prove de Morgan's theorem.
- 33) Explain Frequency Modulated Transmitter by using block diagram.

## PART - IV

**Note : Answer all the questions**

**5 x 5 = 25**

34) Derive an expression for electric field due to an electric dipole along its equatorial line.

(or)

Describe the working of a transistor amplifier.

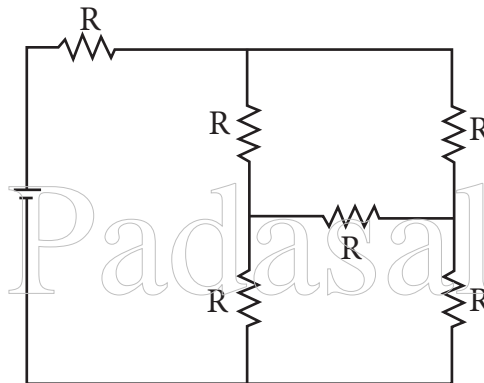
35) Describe the principle, construction and working of cyclotron.

(or)

What are cosmic rays? Explain how the intensity of the cosmic rays changes with latitude and altitude.

36) (a) Derive an expression for resultant of resistances when connected in series.

(b) Calculate the resultant resistance of the given circuit



(or)

(a) Derive an expression for bandwidth of Interference fringes in Young's double slit experiment.

37) Obtain an expression for the radius of the  $n^{\text{th}}$  electronic orbit of an atom based on Bohr's theory.

(or)

What is the principle of radar? Describe the transmission and reception of radar by using block diagram.

38) Discuss with theory the method of inducing emf in a coil by changing its orientation with respect to the direction of the magnetic field.

(or)

Explain the action of operational amplifier as (i) inverting amplifier and as (ii) difference amplifier.

## HIGHER SECONDARY SECOND YEAR

## PHYSICS

## MODEL QUESTION PAPER-III

TIME : 2.30 HOURS

MARKS : 70

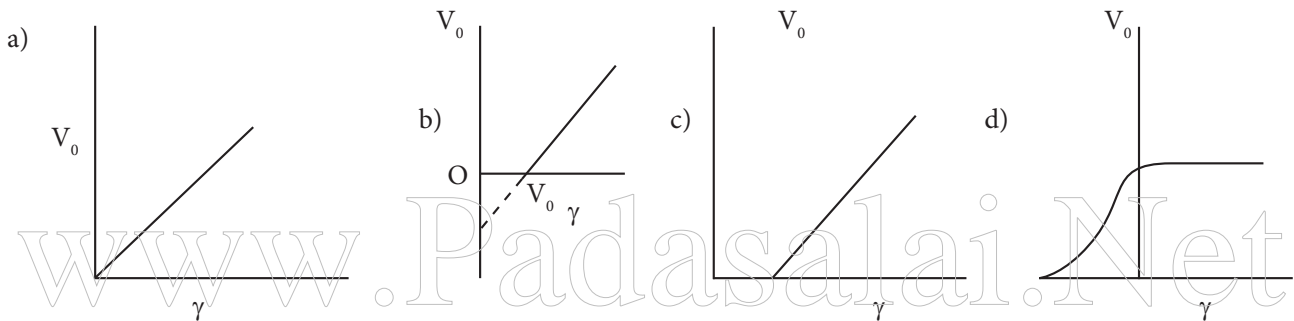
## PART-I

## I. CHOOSE THE CORRECT ANSWER.

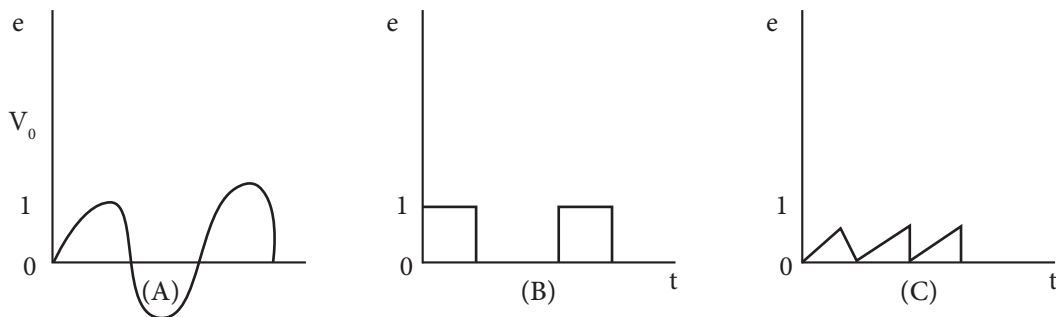
15x1=15

1. An electron and a proton are placed at a distance of  $r$  apart in free space. The ratio of the electrostatic force to the gravitational force between them is of the order of
- a)  $10^{38}$       b)  $10^{39}$       c)  $10^{40}$       d)  $10^{41}$
2. The core of the transformer is laminated to minimize
- a) hysteresis loss      b) eddy current  
c) copper loss      c) flux loss
3. Kirchoff's laws can be applied for
- a) only D.C circuits      b) only A.C circuits  
c) both D.C and A.C      d) none
4. Which of the following represents Biot - Savart law?
- a)  $dB = \frac{\mu_o}{4\pi} \frac{Id\ell}{r^2}$       b)  $\vec{dB} = \frac{\mu_o}{4\pi} \frac{Id\ell \times \vec{r}}{r^2}$   
c)  $\vec{dB} = \frac{\mu_o}{4\pi} \frac{Id\ell \times \vec{r}}{r^2}$       d)  $dB = \frac{\mu_o}{4\pi} \frac{Idl \sin\theta}{r^3}$
5. A coil of wire of certain radius has 500 turns and a self inductance of 100 mH. The self inductance of another similar coil with 400 turns is
- a) 64 mH      b) 80 mH      c) 100 mH      d) 76 mH
6. The ratio of velocities of visible light of wave length  $4000 \text{ \AA}$  and infrared ray of wavelength  $9000 \text{ \AA}$  in free space is
- a) 0.44      b) 2.25      c) 1      d)  $\infty$

7. Intensity of the central maximum in Young's double slit experiment is  $I$ . When one of the slit is closed the intensity is  $I_0$ . The ratio  $I / I_0$  is
- a) 2 : 1                      b) 1 : 2                      c) 4 : 1                      d) 1 : 4
8. Rydberg's constant for He is
- a)  $1.094 \times 10^7 \text{m}^{-1}$       b)  $2.188 \times 10^7 \text{m}^{-1}$       c)  $4.376 \text{m}^{-1}$               d)  $6.625 \times 10^7 \text{m}^{-1}$
9. The longest wavelength that can be analysed by a rock salt crystal of lattice distance 2.82 Å in the second order is
- a)  $5.64 \times 10^{-10} \text{m}$       b)  $1.128 \times 10^9 \text{m}$       c)  $2.82 \times 10^{-10} \text{m}$       d)  $5.46 \times 10^{-10} \text{m}$
10. Which of the following graph shows the variation of cut off voltage  $V_0$  with frequency of incident light



11. The variation of signals with time is shown



- a) all are analogue signals
- b) A, B are digital C is analogue
- c) A and C are digital but B is analogue
- d) A and C are analogue but B is digital

12. For a certain radio active substance it is observed that after 4 hours, only 6.25 % of the original sample is left undecayed. It follows that,
- the half life of the sample is 1 hour
  - the mean life of the sample is  $\frac{\log 2}{3600}$  hours
  - mean life of the sample is 1 hour
  - all the above are correct
13. Out of the following, which is not emitted by a radio active substance is
- Electrons
  - Electromagnetic radiations
  - Neutrons
  - Helium nuclei with a charge equal to that of two protons.
14. The electromagnetic energy is converted into an electrical signal at
- receiver
  - transmitter
  - Antenna
  - both receiver and transmitter
15. In amplitude modulation, if signal amplitude and carrier amplitude are equal, then the amplitude of lower side band is
- $E_c$
  - $W_c - (W_s)_{\max}$
  - $\frac{E_c}{2}$
  - $W_c + (W_s)_{\max}$

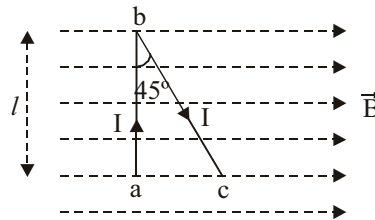
### PART - II

Answer any six questions in which Q.no: 18 is compulsory.

6x2=12

- 16) State Gauss law. Give the unit of electric flux.
- 17) A coil of area  $10 \text{ cm}^2$  is placed in a uniform magnetic field of  $0.3 \text{ Wb / m}^2$  with its plane perpendicular to the field. The coil rotates at a uniform rate to complete one revolution in 8 s. Find the average emf in the coil during intervals when the coil rotate from  $0^\circ$  to  $90^\circ$ .
18. A stream of electrons each of mass  $m$  charge  $e$  and velocity  $3 \times 10^7 \text{ ms}^{-1}$  is deflected 4 mm is passing for 15 cm through an electricfield of  $1800 \text{ Vm}^{-1}$  perpendicular to their path calculate  $e/m$  for electrons.

19. Give any four applications of photo electric cell
20. Give any two inferences obtained from BE/A curve.
21. When a nucleus (x) undergoes  $\beta$  decay and transforms to the nucleus (y) does the pair (x,y) form isotopes, isobars or isotones? Justify your answer.
22. A carrier wave of peak voltage 18 V is used to transmit a message signal Calculate the peak voltage of the modulating signal in order to have a modulation index of 50%.
23. Define output impedance of a transistor.
24. A wire abc is carrying current. It is bent as shown and is placed in a uniform magnetic field of magnetic induction B. Length ab = l and an angle  $\angle abc = 45^\circ$  calculate the ratio of force on ab and on bc?



PART-III

Answer all the Questions in which Q. No: 31 is compulsory.

6 x 3 = 18

25. A parallel plate capacitor is maintained at some potential difference. A 1mm thick slab is introduced between the plates. To maintain the plates at the same potential difference, the distance between the plates is increased by 2.4 mm. Find the dielectric constant of the slab.
26. What are the application of super conductors?
27. Explain positive and negative Thomson effect.
28. Obtain an expression for the current flowing in a circuit containing a pure inductance.
29. State and explain Brewster's law.
30. A soap film of refractive index  $4/3$  and of thickness  $1.5 \times 10^{-3}$  mm is illuminated by white light incident at an angle of  $60^\circ$ . The reflected light is examined by a spectroscope in which dark band corresponds to a wavelength of  $5000 \text{ \AA}$ . Calculate the order of the dark band.

31. Why the base region of a transistor made thin and lightly doped? Draw circuit diagram of input and output characteristics of N-p-N transistor in a common emitter configuration.
32. Explain the working of half wave diode rectifier.
33. What is meta stable state? Draw the energy level diagram for He-Ne laser.

#### PART-IV

Answer all the Questions

5 x 5= 25

34. a) Describe the principle, construction and working of Vandegraff generator.

or

Give the Barkhausen criteria for oscillations. What are the essential component of LC oscillator. Explain the working of colpitt's oscillator (no need of circuit diagram).

35. Describe the construction and working of Bain bridge mass spectrometer.

or

Discuss the theory of plane transmission grating.

36. Obtain an expression for the magnetic induction at a point along the axis of a circular coil carrying current.

or

State the postulates of special theory of relativity and derive Einstein's mass energy equivalence.

37. Derive an expression for RMS value of a.c..

or

State and verify Faraday's laws of electrolysis.

38. Discuss the analysis of Amplitude modulation.

or

Describe the J.J. Thomson method for determining specific charge of electron.