Roll No. 2017058138

Total No. of Questions : 26]

052/B

[Total No. of Printed Pages : 4

SS

2037

ANNUAL EXAMINATION SYSTEM

PHYSICS (Theory)

(Common for Science & Agriculture Groups)

(English Version)

(Evening Session)

Time allowed : Three hours

Maximum marks : 70

Note : *(i) You must write the subject-code/paper-code* **052/B** *in the box provided on the title page of your answer-book.*

(ii) Make sure that the answer-book contains 30 pages (including title page) and are properly serialed as soon as you receive it.

(iii) Question/s attempted after leaving blank page/s in the answer-book would not be evaluated.

(iv) Use of unprogrammable calculator/log tables is allowed.

(v) Answers should be to the point and supported by relevant formulas / law / principle/ diagram.

(vi) Question no. **1** *to* **8** *will be of one mark each.*

(vii) Question no. **9** *to* **16** *will be of two marks each.*

(viii) Question no. **17** *to* **23** *will be of four marks each. There will be internal choice in any* ***two*** *questions.*

(ix) Question no. **24** *to* **26** *will be of six marks each. There will be internal choice in them.*

1. A fuse wire is a wire of

(a) Both low resistance and low melting point.

(b) High resistance and low melting point.

(c) Low resistance and high melting point.

(d) Both high resistance and high melting point. 1

2. The following truth table represents

A	B	y
0	0	1
1	0	1
0	1	1
1	1	0

1

(a) AND gate (b) NOR gate (c) OR gate (d) NAND gate

3. The minimum wavelength of the X-rays produced by electrons accelerated through a potential of 'V' (in volt) is directly proportional to

(a) $\sqrt{V}$ (b) V^2

(c) $\frac{1}{\sqrt{V}}$ (d) $\frac{1}{V}$ 1

4. Write whether the given statement is true or false : A diamagnetic substance is feebly attracted by a magnet. 1

5. Among α (alpha), β (beta) and γ (gamma) radiations, which one is not affected by a magnetic field ? 1

6. Define the SI unit of self-inductance. henry 1

7. What is function of transducer ? 1

8. Write the following radiations in a descending order of their frequencies : red light, X-rays, microwaves, radio-waves. 1

9. A resistance of a tungsten filament at 150°C is 133Ω. What will be its resistance at 500°C ? The temperature coefficient of resistance of tungsten at 0°C is 0.0045 $°C^{-1}$. 2

10. Which material is preferred for making permanent magnets ? Give reason for your choice ? 2

11. Why is the coil of a dead-beat galvanometer wound on a metal frame ? 2

12. Microwaves are used in RADAR, why ? 2

13. Define (i) critical angle (ii) polarising angle. 2

14. For a common emitter amplifier, dc (direct current) current gain is 60. If the emitter current is 6.6 mA, calculate the collector and base current. 2

15. What is space wave propagation ? Give one example of communication system, which use space wave mode. 2

16. What is the focal length of the combination of a convex lens of focal length 30 cm in contact with a concave lens of focal length 20 cm ? Is the system a converging or diverging lens ? Ignore thickness of the lenses. 2

17. Derive an expression for the capacitance of parallel plate capacitor when a dielectric slab is introduced between the plates of capacitor. 4

or

Two charges 6×10^{-6} C and -4×10^{-6} C are located 10 cm apart. At what points on the line joining the two charges is the electric potential zero ? Take the potential at infinity to be zero. 4

18. What is the principle of a potentiometer ? With the help of circuit diagram, explain the use of potentiometer measure internal resistance of a given primary cell. 4

19. Give the principle of a transformer, construction of a step-down transformer. Give any two energy losses of a transformer. 4

20. State the laws of photoelectric emission. 4

or

Light of wavelength 5500 Å (angstrom) falls on a photosensitive plate with work function 1.7 eV. Find (a) energy of photon in eV (electron volt), (b) maximum kinetic energy of photoelectron and (c) stopping potential. 4

21. With the help of circuit diagram, explain the working of npn transistor as an amplifier in common emitter configuration. 4

22. Draw the graph showing variation of binding energy per nucleon with mass number. Write the inferences drawn from the graph. 4

23. Derive the expression : $-\frac{\mu_1}{u} + \frac{\mu_2}{v} = \frac{\mu_2 - \mu_1}{R}$, when refraction occurs from rarer to denser medium at convex spherical refracting surface ($\mu_1 < \mu_2$). (Where u, v and R, are object distance, image distance and radius of curvature of spherical surface respectively). 4

24. (a) What would be the work done, if a point charge '+q' is taken from a point A to a point B on the circumference of a circle drawn with another point charge +q at the centre ? 1

(b) State Gauss's theorem in electrostatics. Using Gauss's theorem in electrostatics, derive an expression for electric field intensity at a point due to infinite sheet of charge. How does the electric field change for a thick sheet of charge ? 1,3,1

or

(a) Define the SI unit of electric charge. 1

(b) Two point charges q and – q is placed at a distance 2a apart. Calculate the electric field at a point P situated at a distance r along the axial line of an electric dipole. What is the electric field when r >> a ? Also, give the direction of electric field w.r.t. electric dipole moment. 3,1,1

25. (a) State the rule that is used to find the direction of field acting at a point near a current carrying straight conductor. 1

(b) State Ampere's circuital law. Using this law, obtain an expression for the magnetic field due to an infinitely long wire carrying current. 1,4

or

(a) An electric charge enters in electric field at right angles to the direction of electric field. What is the nature of the path followed ? 1

(b) With the help of labelled diagram, give the principle, construction and theory of cyclotron. 1,1,1,2

26. (a) Define power of a lens. 1

(b) By giving assumptions made, derive the lens maker formula for a double convex lens. 1,4

or

(a) What are coherent sources of light ? 1

(b) State the necessary conditions for sustained interference pattern. Derive an expression for the fringe width using Young's double slit method for interference of light. 2,3