MODEL TEST PAPER

Physics

Time allowed: 3 hrs MM: 70

Note:

i. Question Nos. 1 to 8 will be of one mark each.

ii. Question Nos. 9 to 16 will be of two marks each.

iii. Question Nos. 17 to 23 will be of four marks each. There will be internal choice any two questions.

iv. Question Nos. 24 to 26 will be of six marks each. There will be internal choice in them.

1. The specific resistance of a conductor increases with

(a) Increase in temperature.

(b) Increase in cross-sectional area.

(c) Decrease in length

(d) Decrease in cross-sectional area. 1

2. The following truth table represents

A	B	Y
0	0	1
1	0	0
0	1	0
1	1	0

(a) AND gate (b) NOR gate (c) OR gate (d) NAND gate 1

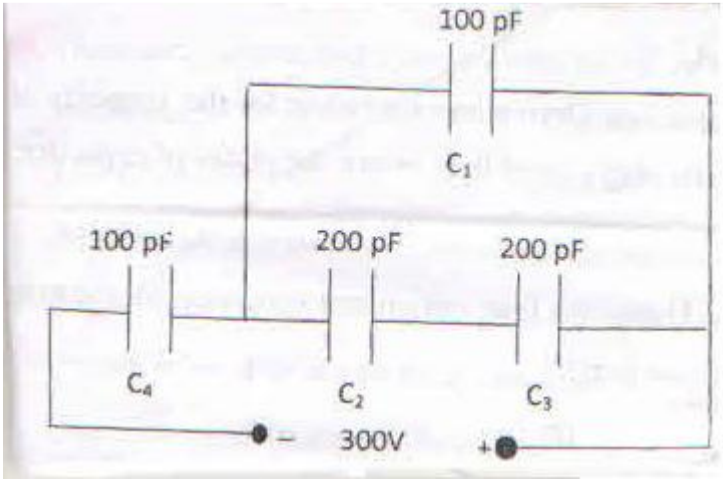
3. An electron of mass 'm' and charge 'e' is accelerated from rest through a potential difference 'V' in vacuum. Its final velocity will be

(a) $\frac{eV}{2m}$ (b) $\frac{eV}{m}$ (c) $\sqrt{\frac{2eV}{m}}$ (d) $\sqrt{\frac{eV}{m}}$

4. Write whether the given statement is true or false: The magnetic susceptibility (χ_m) of a paramagnetic substance has a small negative value. 1
5. Name the three basic elements of a communication system. 1
6. Which has greater ionizing power: alpha particle or beta particle? 1
7. Write the following radiations in an ascending order in respect of their frequencies: X-rays, microwaves, UV (ultra-violet) rays and radio waves. 1
8. State Lenz's law of electromagnetic induction. 1
9. A wire has a resistance of 10.5Ω at 21°C and 16.4 Ω at 147°C. Find the value of temperature coefficient of resistance. 2
10. What type of magnetic material is used in making electromagnets and why? 2
11. An induced current has no direction of its own. Explain, why? 2
12. The small ozone layer on top of the stratosphere is crucial for human survival. Why? 2
13. Write the conditions for total internal reflection to take place. 2
14. In Young's double slit experiment, the slits are separated by 0.56 mm and the screen is placed 2.8 m away. The distance between the central bright fringe and the fifth bright fringe is 1.5 cm. Find the wavelength of light used. 2
15. For a common emitter amplifier, dc (direct current) current gain is 100. If the base current is 20 μA, calculate the collector and emitter current. 2
16. Why sky wave propagation is not possible for high frequency radio waves? 2
17. Derive an expression for energy stored in a capacitor. In which form energy is stored? 4

or

Obtain the equivalent capacitance of the network is given figure. For a 300V supply, determine the charge across capacitor C_4. 4



18. With the help of a circuit diagram, explain how a metre bridge can be used to find the unknown resistance of a given wire. 4
19. Derive an expression for average power of an AC (alternating current) circuit. 4
20. What is photoelectric effect? Explain the effect of increase of (i) frequency (ii) intensity of incident radiation on photoelectric current with suitable graphs. 4

or

Light of wavelength 2200A° (angstrom) falls on a photosensitive plate with work function 4.1 eV. Find (a) energy of photon in eV (electron volt), (b) maximum kinetic energy of photoelectron and (c) stopping potential. 4

21. State radioactive decay law. Prove that radioactive decay is exponential in nature. 4
22. With the help of circuit diagram, explain the V-I characteristics of p-n junction diode in forward biasing. 4
23. State Huygens' principle. Using Huygens' wave theory, prove the laws of reflection. 4

24. (a) Which physical quantity has its SI unit (1) Cm (2)N/C. ½, ½

(b) Two point charge 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 perpendicular bisector of the line joining the charges. What is the electric field when r>>a? Also, give the direction of electric field w.r.t. electric dipole moment? 3,1,1

or

(a) A charged rod P attracts rod R whereas P repels another charged rod Q. What type of force is developed between Q and R? 1

(b) Define the capacitance of capacitor. Derive an expression for the capacity of a parallel plate capacitor with a dielectric slab placed in between the plates of capacitor. 1, 4

25. (a) What is shunt? 1

(b) State Ampere's circuital law. Using this law, obtain an expression for the magnetic field well inside the solenoid of finite length. 1, 4

or

(a) Define one tesla. 1

(b) Derive an expression for force experienced by a current carrying straight conductor placed in a magnetic field. How can we find the direction of force? 4, 1

26. (a) What are characteristics of image formed by a plane mirror? 1

(b) By giving sign conventions made, derive the mirror formula for a concave mirror. 1, 4

or

(a) What is least distance of distinct vision for a normal human eye? 1

(b) With the help of labelled diagram, give the principle and magnifying power of astronomical telescope, when final image is formed at least distance of distinct vision. 1, 1, 3