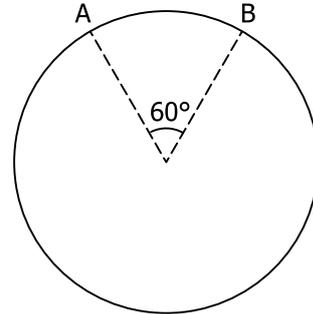
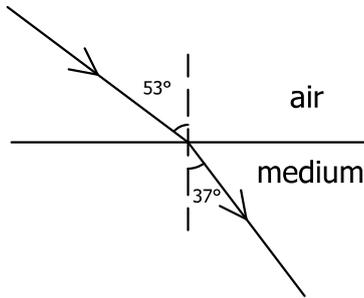


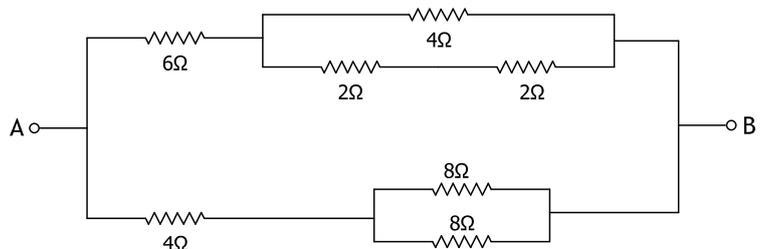
PHYSICS (10 × 6 = 60 Marks)

Attempt all questions

17. 27 spherical drops of a liquid are merged to form a single large spherical drop. If the radius of the smaller drop is 1 mm, find the radius of the larger drop. Also find the ratio surface area of the larger drop to the total surface area of all the drops.
18. Equal volumes of two miscible liquids of relative densities 6 and 2 are mixed to form a homogenous mixture. A cube floats on this liquid mixture with half its volume submerged. If instead equal masses of these liquids were mixed, find the fraction of the volume of the cube that would submerge in the mixture.
19. A car travels between places A and B covering part of the distance at 40 kmph in 1 hour and the remaining distance at 30 kmph in 2 hours. In the return journey from B to A along a different path which is $\frac{3}{2}$ times longer the speed is 75 kmph for the entire journey. Find the average speed of the car for the round trip.
20. An electric train is moving at 36 kmph. When its power is turned off, it stops in 20 s. If the train were moving at 54 kmph, find how far ahead of the station should the power be turned off, to halt the train at the station. Assume same uniform retardation in both the cases.
21. A ray of light passing from air in to a medium is incident at 53° . Angle of refraction in the medium is 37° . Find the sine of angle of refraction if the angle of incidence is changed to 37° . (Use $\sin 37^\circ = \frac{3}{5}$ and $\sin 53^\circ = \frac{4}{5}$)



22. A uniform wire is made in to a circular ring. Equivalent resistance between points A and B on the ring which subtend an angle of 60° at the center of the ring is R. Find the equivalent resistance between A and B if the angle is increased to 120° .
23. Space above mercury in a barometric tube has a water column of 27.2 cm. If the atmospheric pressure is 76 cm of mercury, find the length of the mercury column above the mercury level in the trough of the barometer. What is the pressure at the top of the mercury column? Assume that space above water is vacuum. Atmospheric pressure is 76 cm of Hg and densities of mercury and water are 13.6 g/cm^3 and 1 g/cm^3 .
24. Potential difference between A and B is 16 V. Find the currents in the 6Ω and 8Ω resistances.



25. A car is moving on a highway at 34 m/s. A man is standing by the side of the highway a long distance ahead of the car. Car sounds its horn for a 5 s duration. The car passes the man sometime after the horn is sounded. Find the length of time during which the man hears the sound of the horn. (Speed of sound is 340 m/s.)
26. Energy released per fission of one uranium nucleus U^{235} is 200 MeV. Find the number of reactions taking place in one minute in a nuclear reactor producing a power of 800 MW. Assume 50% efficiency in the conversion process. Also find the mass lost in 1 hour.

CHEMISTRY

Attempt all questions. Each question carries 3 marks.

SECTION-A : Each question is provided with 4-alternative answers. One or more than one of them are correct answers. Indicate the correct answer by A,B,C,D.

27. NO_3^- ion is detected by a popular test known as brown ring test. During this test NO_3^- ion acts as
A) oxidant B) reductant C) both oxidant and reductant D) spectator ion
28. One of the phosphorus compound is popularly used as rat poison. The oxidation number of the phosphorus in this compound is
A) zero B) -2 C) -3 D) +2
29. If there were 9-periods in the periodic table then how many elements would 9th period can maximum comprise of
A) 72 B) 32 C) 50 D) 56
30. Energy is emitted when electron jumps from higher energy level to lower energy. In which transition the wave length emitted is minimum
A) an electron jumps from 2nd to 1st level B) an electron jumps from 3rd to 2nd level
C) an electron jumps from 4th to 3rd level D) an electron jumps from 5th to 4th level
31. Which of the following is the correct set of quantum numbers for differentiating electron between calcium and scandium
A) $n = 4$ $l = 0$ $m = 0$ $s = +\frac{1}{2}$ B) $n = 4$ $l = 2$ $m = 0$ $s = +\frac{1}{2}$
C) $n = 3$ $l = 2$ $m = -2$ $s = +\frac{1}{2}$ D) $n = 4$ $l = 2$ $m = -2$ $s = +\frac{1}{2}$

SECTION-B : In each question a blank or blanks are left. Fill in the blank(s) with relevant answer(s).

32. As safety measure in public places fire extinguishers are arranged. What compounds are there in fire extinguishers? _____ , _____
33. On Dewali day while burning a cracker a brilliant green light emitted. Which metal you expect in the cracker _____
34. 1 mole of radioactive substance 'X' disintegrates by α -emission. Its half life time is 10 days. After 20-days the amount of Helium gas liberated at STP is _____
35. Silica on reaction with sodium hydroxide produces a compound. The common name of the compound formed is _____ and its chemical formula is _____
36. In metallurgy in the isolation of metals, in calcinations/roasting process usually ore is finally converted into _____ form
37. Among Ni^{+4} , Cu^{+2} , Mn^{+4} , Co^{+3} , Cr^{+1} the species having same number of unpaired electrons _____
38. The concentration of the hydrogen ion in a sample of soft drink is $2 \times 10^{-3} \text{M}$. The pOH of the solution is _____ and its p^{k_w} is _____
39. Arrange in the increasing order of ionic radii for isoelectronic species K^+ , S^{2-} , Ca^{+2} , Cl^- _____
40. What is the starting material for the preparation of propane by decarboxylation method _____
41. The solubility product of an electrolyte A_3B_2 if its solubility is 'S' _____
42. In the extraction of Mg metal from MgCl_2 , the NaCl and KCl are added. This is to decrease _____ and increase _____.
43. The pH of the pure water at 25°C is 7. The pH of the solution after addition of 1 gm of KCl per liter of water is _____
44. Hot and conc. NaOH is treated with chlorine gas. The gas undergoes disproportionation. The balanced equation for this reaction is _____
45. The valencies of carbon in alkane, alkene and alkyne respectively are _____ , _____ , _____
46. Ammonia and air mixture is passed over heated platinum gauze at 800°C under high pressure conditions. Write balanced equation _____