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39 YEARS OF TEACHING EXCELLENCE

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SAMPLE PAPER - 99

Time : 1 : 15 Hr.   **Question : 60**

PHYSICS

01. A person moves 30 m north, then 30 m east, then $30\sqrt{2}$ south-west. His displacement from the original position is
    (1) zero   (2) 28 m towards south
    (3) 10 m towards west   (4) 15 m towards east

02. A force is inclined at 60° to the horizontal. If its rectangular component in the horizontal direction is 50 N, then magnitude of the vertical component of force is approximately
    (1) 25 N   (2) 84 N
    (3) 87 N   (4) 90 N

03. If $\vec{A} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ then the direction of cosines of the vector $\vec{A}$ are
    (1) $\dfrac{2}{\sqrt{45}}, \dfrac{4}{\sqrt{45}}$ and $\dfrac{-5}{\sqrt{45}}$ (2) $\dfrac{1}{\sqrt{45}}, \dfrac{2}{\sqrt{45}}$ and $\dfrac{3}{\sqrt{45}}$
    (3) $\dfrac{4}{\sqrt{45}}, 0$ and $\dfrac{4}{\sqrt{45}}$ (4) $\dfrac{3}{\sqrt{45}}, \dfrac{2}{\sqrt{45}}$ and $\dfrac{5}{\sqrt{45}}$

04. A body has an initial velocity of 3 m/s and has an acceleration of 1 m/sec^2 normal to the direction of the initial velocity. Then its velocity 4 seconds after the start is
    (1) 7 m/sec along the direction of initial velocity
    (2) 7 m/sec along the normal to the direction of initial velocity
    (3) 7 m/sec mid-way between the two directions
    (4) 5 m/sec at an angle off $\tan^{-1}(4/3)$ with the direction of initial velocity.

05. An airplane moving horizontally with a speed of 180 km/hr drops a food packet while flying at a height of 500 m. The horizontal range is
    (1) 180 m   (2) 980 m
    (3) 500 m   (4) 670 m

06. A car is going in south with a speed of 5 m/s. To a man sitting in car a bus appears to move towards west with a speed of $2\sqrt{6}$ m/s. What is the actual speed of the bus ?
    (1) 4 ms^{-1} (2) 3 ms^{-1}
    (3) 7 ms^{-1} (4) none of these

07. Rain is falling vertically with a speed of 35 m s^{-1}. Winds starts blowing after sometime with a speed of 12 m s^{-1} in east to west direction. At what angle with the vertical should a boy waiting at a bus stop hold his umbrella to protect himself from rain ?
    (1) $\sin^{-1}\left(\dfrac{12}{35}\right)$ (2) $\cos^{-1}\left(\dfrac{12}{35}\right)$
    (3) $\tan^{-1}\left(\dfrac{12}{35}\right)$ (4) $\cot^{-1}\left(\dfrac{12}{35}\right)$

08. A motor car is travelling at 60 m/s on a circular road of radius 1200 m. It is increasing its speed at the rate of 4 m/s. The acceleration of the car is
    (1) 3 m/s^2 (2) 5 m/s^2
    (3) 5 m/s^2 (4) 7 m/s^2

09. A stone tied to the end of a string 100 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 14 revolutions in 22s, then the acceleration of the stone is
    (1) 16 m s^{-2} (2) 4 m s^{-2}
    (3) 12 m s^{-2} (4) 8 m s^{-2}

10. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle, the motion of the particle takes in a plane. It follows that
    (1) its velocity is constant
    (2) its acceleration is constant
    (3) its kinetic energy is constant
    (4) it moves in a straight line

11. The resultant of two forces, one double the other in magnitude, is perpendicular to the smaller of the two forces. The angle between the two forces is :
    (1) 120^0 (2) 60^0
   (3) 90^0 (4) 150^0

12. A swimmer wishes to cross a 500 m river flowing at 5 km/h. His speed with respect to water is 3 km/h. The shortest possible time to cross the river is :
(1) 10 min
(2) 20 min
(3) 6 min
(4) 7.5 min

13. Essential characteristic of equilibrium is -
(1) momentum equals zero
(2) acceleration equals zero
(3) K.E. equals zero
(4) velocity equals zero

14. When a horse pulls a wagon, the force that causes the horse to move forward is the force.
(1) exerted by horse on the wagon
(2) exerted by wagon on horse
(3) exerted on horse by surface
(4) exerted by horse on the ground

15. Two masses of 5 kg and 10 kg are connected to a pulley as shown. What will be the acceleration if the pulley is set free. (g = acceleration due to gravity)
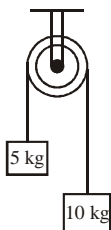
(1) g
(2) $\dfrac{g}{2}$
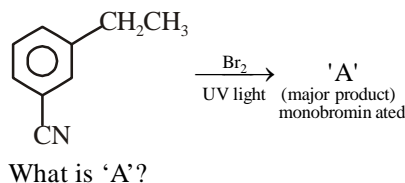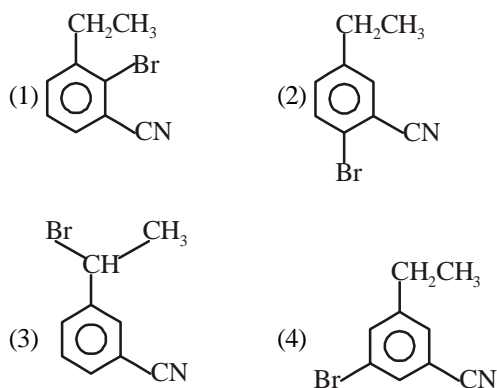(3) $\dfrac{g}{3}$
(4) $\dfrac{g}{4}$

CHEMISTRY

16. Select the incorrect matching. Here E stands for lone pair of electrons:
(1) AB_3E – Trigonal pyramidal shape
(2) AB_2E - Bent shape
(3) AB_2E_2 — Tetrahedral shape
(4) AB_4E – See saw shape

17. Which of the following alkyl halides yields the product shown as the only possible product of an E_2 reaction?
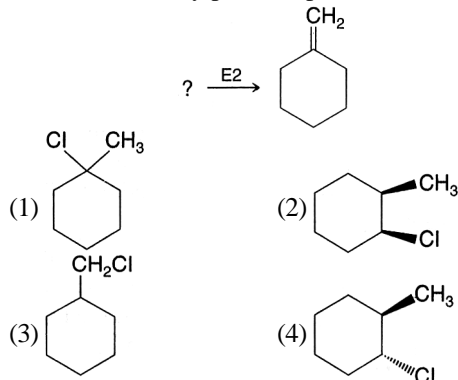
18. How many chiral compounds are possible on monochlorination of 2-methylbutane?
(1) 8
(2) 2
(3) 4
(4) 6

19. Which of the following does not show positive or in phase overlap?

20. Which of the following is correct with respect to the repulsion according to Nyholm and Gillespie's VSEPR theory?
(1) $lp – lp > lp – bp > bp – bp$
(2) $lp – bp > bp – bp > lp – lp$
(3) $bp – bp > lp – lp > lp – bp$
(4) $lp – lp > bp – bp > lp – bp$

21. Which of the following is the correct order of ionization enthalpies of elements of 14th group?
(1) $C > Si > Ge > Sn > Pb$
(2) $C > Si > Ge > Sn < Pb$
(3) $C < Si < Ge < Sn < Pb$
(4) $C < Si > Ge > Sn < Pb$

22. The correct order of electron gain enthalpy is
(1) $S > Se > Te > O$
(2) $Te > Se > S > O$
(3) $O > S > Se > Te$
(4) $S > O > Se > Te$

23. In $\overset{1}{C}H_2 = \overset{2}{C} = \overset{3}{C}H - \overset{4}{C}H_3$ molecule, the hybridization of carbon 1, 2, 3 and 4 respectively are:
(1) sp^3, sp, sp^3, sp^3
(2) sp^2, sp^2, sp^2, sp^3
(3) sp^2, sp, sp^2, sp^3
(4) sp^2, sp^2, sp^2, sp^3

24. Which pair of oxides is acidic in nature?
(1) B_2O_3, CaO
(2) B_2O_3, SiO_2
(3) N_2O, BaO
(4) CaO, SiO_2

25. For the given reaction:

What is 'A'?

(1) structure with CH₂CH₃, Br, CN

(2) structure with CH₂CH₃, CN, Br

(3) structure with Br, CH-CH₃, CN

(4) structure with CH₂CH₃, Br, CN

26. The correct order of bond dissociation enthalpy of halogens is:
(1) $Cl_2 > F_2 > Br_2 > I_2$
(2) $I_2 > Br_2 > Cl_2 > F_2$
(3) $Cl_2 > Br_2 > F_2 > I_2$
(4) $F_2 > Cl_2 > Br_2 > I_2$

27. In which of the following pairs, the outer most electronic configuration will be the same?
(1) Cr^+ and Mn^{2+} (2) Ni^{2+} and Cu^+
(3) Fe^{2+} and Co^{+3} (4) V^{2+} and Cr^+

28. In polymer Buna-S: 'S' stands for:-
(1) Sulphonation   (2) Strength
(3) Sulphur   (4) Styrene

29. In Dumas' method of estimation of nitrogen 0.35 g of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be: (Aqueous tension at 300 K =15 mm)
(1) 14.45   (2) 15.45   (3) 16.45   (4) 17.45

30. The Lassaigne's extract is boiled with dil. HNO_3 before testing for halogens because
(1) Silver halides are soluble in HNO_3
(2) Na_2S and NaCN are decomposed by HNO_3
(3) Ag_2S is soluble in HNO_3
(4) AgCN is soluble is HNO_3

BOTANY

31. Bryophyllum reproduce by:
(1) Binary fission   (2) Leaf buds
(3) Buds   (4) Zoospores

32. Water hyacinth reproduce by:
(1) Offset   (2) Suckers
(3) Bud   (4) Runner

33. Bulbils occur in:
(1) Penicillium   (2) Agave
(3) Bryophyllum   (4) All of these

34. Chromosome numbers in meiocyte of Potato is:
(1) 38   (2) 46   (3) 48   (4) 24

35. Isogametes are:
(1) Morphologically alike
(2) Functionally alike
(3) Sterile
(4) Those which develop parthenogenetically

36. In flowering plants Meiosis takes place in:
(1) Meiocyte   (2) Microspore
(3) Zygote   (4) Megaspore

37. Pollen grains are able to withstand extremes of temperature, strong acids and alkali and desiccation because their exine is composed of:
(1) Pecto-cellulose   (2) Suberin
(3) Sporopollenin   (4) Callosc

38. In a pollen grain, larger cell is:
(1) Generative cell   (2) Male gamete
(3) Vegetative cell   (4) All of these

39. Tapetum is a part of:
(1) Male gametophyte   (2) Female gametophyte
(3) Anther wall   (4) Ovary wall

40. Meiosis can be observed in:
(1) Spore mother cells   (2) Microspores
(3) Megaspores   (4) All of these

41. Animals and plants are composed of cells and products of cells. This hypothesis was proposed by:
(1) T. Schwann
(2) M.Schleiden
(3) Antone von leeuwenhoek
(4) Mirbel

42. Centrioles and centrosomes occur in the cells of
(1) Green plants
(2) Animals
(3) Bacteria and cyanobacteria
(4) Both 2 and 3

43. Antiobiotic resistance gene in bacteria are located on
(1) Plasmid   (2) Plastid
(3) Nucleoid   (4) Mesosome

44. Number of membranes separating intrathylakoid space from cytoplasm is
(1) 4   (2) 3   (3) 2   (4) 1

45. Granular ER differs from SER in having
(1) Ribosomes on its surface
(2) No ribosomes
(3) Active role in steroid synthesis
(4) Both 2 and 3

46. EFB stands for
(1) European Federation of Biology
(2) European Federation of Botany
(3) European Foundation of Biotechnology
(4) European Federation of Biotechnology

47. Read the following statement (A–E) and answer the question which follows them-
A. Biotechnology is the integration of natural science and organism, cells, parts there of and molecular analogues for production and services.
B. DNA can be chemically altered by genetic engineering.
C. Recombinant DNA use DNA polymerase of its host for replication.
D. Cohen and Boyer are responsible for first artificial synthesis of RNA.
E. Replication of DNA initiates at origin of replication.
How many of the above statement are correct?
(1) One   (2) Two   (3) Three   (4) Four

48. Out of the following, which is not related to biotechnology?
(1) Synthesis of a gene
(2) Correction of a gene
(3) Alteration of gene
(4) Transfer of a gene from parent to offspring

49. Sexual reproduction results in-
(1) No variations
(2) Introduction of desirable variations only
(3) Introduction of undesirable variations only
(4) Introduction of many undesirable variations along with desirable variations

50. In $\underline{A}$, two enzymes were found to be responsible to restrict the growth of the bacteriophage in E. coli. One enzyme add $\underline{B}$ group to DNA while another enzyme cut DNA at specific sites. The latter was termed as $\underline{C}$ and is a type of $\underline{D}$.
(1) A - 1972, C - Restriction endonulease
(2) C - Peptidyl transferase, D - Exonuclease
(3) B - Methyl, D - Endonuclease
(4) A - 1963 - B - Ethyl

51. Most common matrix used in gel-electrophoresis?
(1) Agarose   (2) Ethidium bromide
(3) SDS   (4) Chromatic substrate

52. DNA fragments separate according to size through?
(1) Attractive force effect
(2) Sieving effect
(3) Electrical effect
(4) Centrifugal force

53. The gene rop present in pBR322 cloning vector, codes for
(1) The proteins involved in the translation
(2) The proteins involved in the replication of plasmid
(3) Protein involved in the synthesis of ampicillin only
(4) Protein involved in the synthesis of tetracycline only

54. The term "chimeric DNA" refers to
(1) DNA with overhanging stretches
(2) A recombinant DNA
(3) DNA with palindrome sequences
(4) Molecular scissors

55. Which of the following enzyme will get inactivated in insertional inactivation?
(1) Transacetylase
(2) Permease
(3) β-galactosidase
(4) Taq-polymerase

56. Restriction endonuclease enzyme cut the DNA fragments. These fragments are separated by gel electrophoresis in which $\underline{A}$ charged DNA fragments are forced to move towards the $\underline{B}$ under an electrical field through agarose gel. $\underline{C}$ the size of DNA fragment, more it will travel.
(1) A–Positively; B–Cathode; C–Smaller
(2) A–Negatively; B–Anode; C–Larger
(3) A–Positively; B–Cathode; C–Smaller
(4) A–Negatively; B–Anode; C–Smaller

57. pBR322 has two antibiotic resistance genes. These are against-
(1) Chloramphenicol and Tetracycline
(2) Kanamycin and Chloramphenicol
(3) Ampicillin and Tetracycline
(4) Ampicillin and kanamycin

58. The 'sticky' ends of a fragmented DNA molecule are made of
(1) Calcium salts   (2) Endonuclease
(3) Unpaired bases   (4) Methyl groups

59. DNA is a ...1... molecule and it ...2... pass the plasma membrane
(1) 1–Hydrophilic; 2–Can
(2) 1–Hydrophilic; 2–Can't
(3) 1–Hydrophobic; 2–Can
(4) 1–Hydrophonic; 2–Can't

60. First restriction endonuclease is?
(1) Salmonella   (2) E-coli
(3) Hind–II   (4) Hind–I