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SKD New Standard Coaching Institute

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37 YEARS OF TEACHING EXCELLENCE

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// SAMPLE PAPER - 46 //

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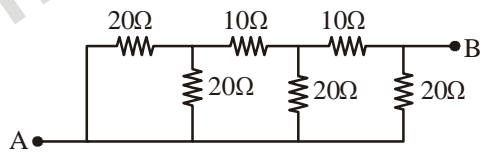
// PHYSICS //

01. A cricketer catches a ball of mass 150 g in 0.1 s moving with speed 20 m/s, then he experiences force of
(1) 300 N   (2) 30 N   (3) 3 N   (4) 0.3 N

02. In a rocket of mass 1000 kg, fuel is consumed at a rate of 40 kg s^{-1}. The velocity of gases ejected from rocket is 5×10^4 m s^{-1}. The thrust on the rocket is
(1) 2×10^3 N   (2) 2×10^4 N
(3) 2×10^6 N   (4) 2×10^8 N

03. If μ_k is the coefficient of kinetic friction, μ_r the coefficient of rolling friction and μ_s the coefficient of static friction, then
(1) $\mu_s > \mu_k > \mu_r$ (2) $\mu_s < \mu_k < \mu_r$
(3) $\mu_s < \mu_r < \mu_k$ (4) $\mu_s > \mu_r > \mu_k$

04. A body is allowed to fall freely under gravity from a height of 10 m. If it loses 25% of its energy on impact with the ground, to what height will it rise after one impact ?
(1) 2.5 m   (2) 5.0 M   (3) 7.5 m   (4) 9.0 M

05. A machine gun fires six bullets per second into a target. The mass of each bullet is 3 g and the speed 500 m/s. The power delivered to the bullets is
(1) 1.5 kW   (2) 2.25 kW   (3) 0.75 kW   (4) 375 W

06. If the system is released, then the acceleration of the centre of mass of the system is
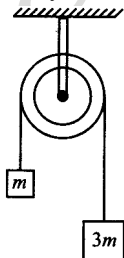
(1) g/4   (2) g/2   (3) g   (4) 2g

07. During inelastic collision between two bodies, which of the following quantities always remain conserved?
(1) Total kinetic energy.
(2) Total mechanical energy.
(3) Total linear momentum.

(4) Speed of each body.

08. A 1 kg body is projected vertically upward with a speed of 200 ms^{-1}. It rises to a height of 1500m. If gravitational field intensity is uniform and equal to 10 N kg^{-1}, then the energy used up in overcoming air resistance is :
(1) 2 kJ   (2) 4 kJ   (3) 5 kJ   (4) 50 kJ.

09. A cylindrical copper rod has length L, radius r and resistance R. If it is melted and formed into another rod of radius $\dfrac{r}{2}$, the resistance will be

(1) 16 R   (2) $\dfrac{R}{16}$ (3) $\dfrac{R}{4}$ (4) 4 R

10. In the circuit shown in figure, the resistance between points A and B is

(1) 40Ω   (2) 20Ω   (3) 10Ω   (4) 5Ω

11. A current I flows through a wire of radius r, length L and resistivity ρ. The current produces heat in the wire. The rate of loss of heat in the wire is proportional to its surface area. In steady state, the current flowing through the wire is proportional to

(1) $\sqrt{\dfrac{r}{\rho}}$ (2) $\sqrt{\dfrac{r^3}{\rho}}$ (3) $\sqrt{\dfrac{r^3 \ell}{\rho}}$ (4) $\sqrt{r^3}$

12. Time period of a particle executing SHM is 16 s. At time t = 2 s, it crosses the mean position. Its amplitude of motion is $\dfrac{32\sqrt{2}}{\pi}$ m. Its velocity at t = 4 s is
(1) 1 ms^{-1} (2) 2 ms^{-1}
(3) 4 ms^{-1} (4) 8 ms^{-1}

13. A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is

(1) $\dfrac{T}{8}$ (2) $\dfrac{T}{12}$ (3) $\dfrac{T}{2}$ (4) $\dfrac{T}{4}$

14. An earth satellite X is revolving around earth in an orbit whose radius is one-fourth the radius of orbit of a communication satellite. Time period of revolution of X is
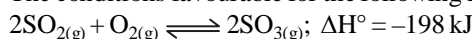
(1) 3 hrs   (2) 6 hrs   (3) 4 days   (4) 72 days

15. From a circular disc of radius R and mass 9M, a small disc of mass M and radius R/3 is removed concentrically. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through its centre is

(1) $\dfrac{40}{9}MR^2$ (2) MR^2 (3) $4\,MR^2$ (4) $\dfrac{4}{9}MR^2$

CHEMISTRY

16. The conditions favourable for the following reaction are:
$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)};\ \Delta H^\circ = -198\,kJ$
(1) low temperature, high pressure
(2) any value of T and P
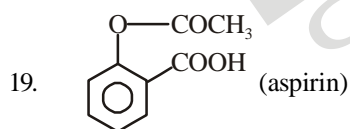(3) low temperature and low pressure
(4) high temperature and high pressure

17. For the reaction $2NO_{2(g)} \rightleftharpoons 2NO_{(g)} + O_{2(g)}$,
$K_c = 1.8\times10^{-6}$ at 184°C and $R = 0.083\ JK^{-1}\,mol^{-1}$. When K_p and K_c are compared at 184°C, it is found that
(1) $K_p > K_c$ (2) $K_p < K_c$ (3) $K_p = K_c$
(4) $K_p \geqslant K_c$ depends on pressure of gases

18. What is the percent ionization (1) of 0.01 M HA solution? ($K_a = 10^{-4}$)
(1) 9.5%   (2) 1%   (3) 10.5%   (4) 7%

19.

O—COCH₃, COOH (aspirin)

is a pain reliever with $pK_a = 2$.
Two tablets each containing 0.09 g of aspirin are dissolved in 100 mL solution.
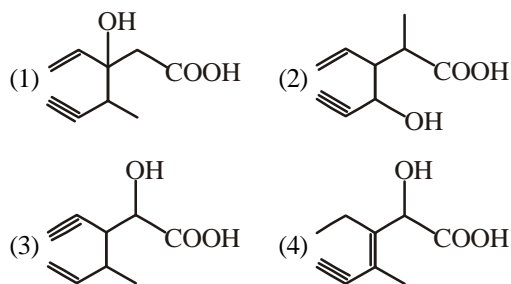pH will be (Molar mass of Aspirin = 180)
(1) 0.5   (2) 1.0
(3) 0.0   (4) 2.0

20. Calculate the pH at the equivalence point in the titration of 25 mL of 0.1 M formic acid with a 0.1 M NaOH solution (given that pK_a of formic acid = 3.74).
(1) 4.74   (2) 8.22
(3) 8.37   (4) 6.06

21. The structure of the compound whose IUPAC name is 3–Ethyl–2–hydroxy–4–methylhex–3–en–5–ynoic acid, is:

(1) [structure] (2) [structure]
(3) [structure] (4) [structure]

22. Which of the following is a chiral compound?
(1) Hexane
(2) Methane
(3) n–Butane
(4) 2,3,4 –Trimethylhexane

23. Which of the following is not chiral?
(1) 3–Bromopentane
(2) 2–Hydroxypropanoic acid
(3) 2–Butanol
(4) 2,3–Dibromopentane

24. How many stereoisomers does this molecule have
$CH_3 - CH = CH - CH_2 - CHBr - CH_3$?
(1) 8   (2) 2   (3) 4   (4) 6

25. The number of structural isomers possible from the molecular formula C_3H_9N is:
(1) 4   (2) 5
(3) 2   (4) 3

26. The maximum number of 90° angles between bond pair-bond pair of electrons is observed in
(1) dsp^3 hybridisation
(2) sp^3d hybridisation
(3) dsp^2 hybridisation
(4) $sp^3 d^2$ hybridisation

27. The hydrogen bond is shortest in
(1) N – H-------O   (2) F – H-------O
(3) S – H-------O   (4) F – H-------F

28. A hydride is crystalline, stoichiometric, non-volatile and non-conducting in solid state. It is likely to be:
(1) Saline hydride
(2) covalent hydride
(3) metallic hydride
(4) molecular hydride

29. Which of the following shows reducing nature of H_2O_2 ?
(1) $2MnO_4^- + 6H^+ + 5H_2O_2 \longrightarrow 2Mn^{2+} + 8H_2O + 5O_2$
(2) $HOCl + H_2O_2 \longrightarrow H_3O^+ + O_2 + Cl^-$
(3) $I_2 + H_2O_2 + 2OH^- \longrightarrow 2I^- + 2H_2O + O_2$
(4) All of the above

30. Select the correct choice for statements (I) and (II):
(I) Hard water forms scum/precipitate with soap.
(II) If soap is $C_{17}H_{35}COONa$ and hard water contains Ca^{2+}, the formation of scum can be shown by the reaction.
$2C_{17}H_{35}COONa + Ca^{2+} \rightarrow 2Na^+ + (C_{17}H_{35}COO)_2Ca\downarrow$
(1) (I) and (II) both are correct and (II) is the proper reason of (I)
(2) (I) and (II) both are correct but (II) is not the proper reason of (I)
(3) (I) is correct but (II) is false
(4) (I) is false but (II) is correct.

BOTANY

31. Which of the following is an example of plasticity?
(1) Heterophylly in cotton, coriander and larkspur
(2) Heterophylly in buttercup
(3) Bolting in beet and cabbage
(4) Both (1) and (2)

32. Auxin was isolated from tips of coleoptiles of
(1) Canary grass by of Charles Darwin and Francis Darwin
(2) Canary grass by F.W. Went
(3) Oat seedlings by Charles Darwin and Francis Darwin
(4) Oat seedlings by F.W. Went

33. Which one of the PGRs would you use if you are asked to?
(A) Induce growth in axillary buds
(B) 'Bolt' a rosette plant
(C) Induce immediate stomatal closure in leaves
(1) A–cytokinin, B–GA, C–ABA
(2) A–auxin, B–GA, C–ABA
(3) A–auxin, B–ethylene, C–GA
(4) A–cytokinin, B–ethylene, C–ABA

34. Read the following statements and find out the incorrect statement.
(1) Auxins initiates flowering in pineapples and ethylene promotes flowering in pineapples
(2) 2, 4-D is used to prepare weed-free lawns by gardeners
(3) There are more than 100 gibberellins reported from widely different organisms such as fungi and higher plants. All GAs are acidic
(4) The ability of GAs to cause an increase length of axis used to increase the length of grapes stalks

35. Richmond–Lang effect is due to
(1) Gibberellins   (2) Auxin
(3) Ethylene   (4) Kinetin

36. Biennials get changed into annuals by
(1) Hormones
(2) Photoperiodism
(3) Grafting
(4) Vernalisation

37. Fill in the blanks:
a. The meristem which occur at the tips of roots and shoots and produce primary tissues are called ...1... meristems.
b. The meristem which occurs between mature tissues is known as ...2... meristem.
c. During the formation of leaves and elongation of stem, some cells, 'left behind' from shoot apical meristem, constitute the ...3...
d. ...4... occurs in grasses and regenerates parts removed by the grazing herbivores.
(1) 1–lateral, 2–apical, 3–intercalary meristem, 4–secondary meristem
(2) 1–apical, 2–lateral, 3–apical bud, 4–lateral meristem
(3) 1–intercalary, 2–lateral, 3–axillary bud, 4–intercalary meristem
(4) 1–apical, 2–intercalary, 3–axillary bud, 4–intercalary meristem

38. Intercalary meristem is a derivative of
(1) Promeristem   (2) Primary meristem
(3) Lateral meristem   (4) Secondary meristem

39. Phylogenetic classification systems based on:
(1) Natural affinities among the organisms
(2) Phytochemistry
(3) Evolutionary relationship between the various organisms
(4) Reproduction

40. Archaebacteria live in:
(1) Only salty areas   (2) Only in marshy areas
(3) Only in hot springs (4) All of these

41. Which statement is correct for lichens?
(1) Algal component is known as mycobiont and fungal component as phycobiont
(2) Fungi prepare food for algae
(3) Algae provide shelter and absorb mineral nutrients and water for its partner
(4) All are incorrect

42. Stilt root found in:
(1) Banyan   (2) Maize
(3) Sugarcane
(4) More than one is correct

43. Whorled type phyllotaxy found in:
(1) China rose   (2) Calotropis
(3) Mustard   (4) Alstonia

44. Drupe Fruit is a character of:
(1) Mango   (2) Coconut
(3) Tomato   (4) Both (1) and (2)

45. When stamens are attached to the Tepal, then condition is called:
(1) Episepalous   (2) Epipetalous
(3) Epiphyllous   (4) More than one is correct

46. Ivan pavlov performed experiments on :
   (1) Simple reflexes   (2) Origin of life
   (3) Cardiac reflexes   (4) Conditioned reflexes

47. The given diagrammatic representation of reflex action shows knee jerk reflex.
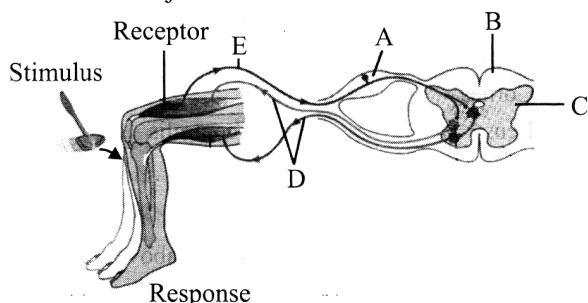
Identify the parts labeled as A to E and select the correct option.

	A	B	C	D	E
(1)	Dorsal root ganglion	White matter	Gray matter	Afferent pathway	Efferent pathway
(2)	Dorsal root ganglion	white matter	Gray matter	Efferent pathway	Afferent pathway
(3)	Ventral root ganglion	Gray matter	White matter	Efferent pathway	Afferent pathway
(4)	Ventral root ganglion	White matter	Gray matter	Efferent pathway	Afferent pathway

48. What is the main function of Nissle's granules ?
   (1) Enhance excitability of nerve cell
   (2) Help in cell division of nerve cell
   (3) Synthesis of myelin sheath
   (4) Synthesis of structural proteins

49. Third and fourth ventricles of the brain are connected by
   (1) aqueduct of Sylvius
   (2) foramen of Monro
   (3) foramen of Magnum
   (4) corpus callosum

50. Anterior choroid plexus is present on the
   (1) floor of diencephalon
   (2) cerebral hemispheres
   (3) roof of diencephalon
   (4) roof of medulla oblongata

51. Photosensitive compound in human eye is made up of
   (1) opsin and retinal
   (2) opsin and retinol
   (3) transducin and retinene
   (4) guanosine and retinol

52. Aqueous and vitreous humour are divided by
   (1) lens   (2) iris
   (3) retina   (4) optic nerve

53. Who isolated antibiotic resistance gene from salmonella typhimurium in 1972 ?
   (1) Jacob and Monod
   (2) Stanley Cohen and Herbert Boyer
   (3) Osborn
   (4) Boliver

54. Which diagram correctly represents the cutting of both strands of DNA by EcoRI?
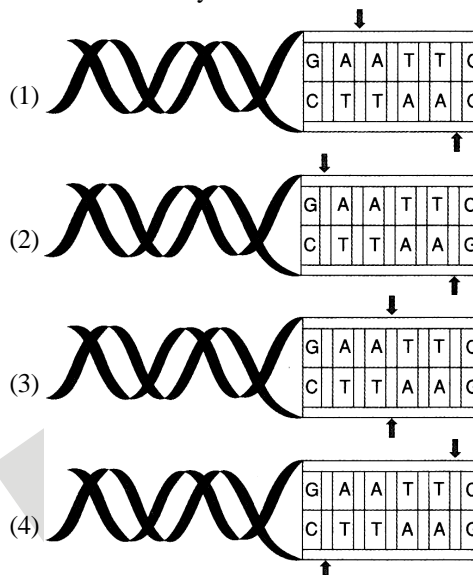
55. The extraction of DNA from a gel piece is known as
   (1) Spooling
   (2) Elution
   (3) AGE
   (4) Annealing

56. Select the incorrect matching
   (1) pBR322   - E.coli cloning vector
   (2) EcoRI, Cla I, Hind III - Restriction enzyme
   (3) ROP   - Protein involved in the replication of the plasmid
   (4) PCR   - Technique in which multiple copies of the gene (or DNA) of interest is synthesized in vitro

57. If any protein encoding gene is expressed in a .... host, it is called a .... protein.
   (1) Homologous host, recombinant
   (2) Heterologous host, recombinant
   (3) Heterologous host, non-recombinant
   (4) Homologous host, non-recombinant

58. A nematode .... infects the roots of tobacco plants and causes great reduction in yield.
   (1) Ancylostoma
   (2) Hookworm
   (3) Meloidogyne incognitia
   (4) Wuchereria

59. Silencing of a gene could be achieved through the use of
(1) Short interfering RNA (RNAi)
(2) Antisense RNA
(3) By both
(4) None of these

60. Which gene does not appear in photographic film in autoradiography ?
(1) Housekeeping gene
(2) Structural gene
(3) Mutated gene
(4) Transcriptionally active gene