// PRABAL TEST PAPER //

Time : 1 : 00 Hr. **Question : 50**

// PHYSICS //

01. A ball is projected with a velocity, $10\ ms^{-1}$, at an angle of $30°$ with the vertical direction. Its speed at the highest point of its trajectory will be:

    (1) $5\sqrt{3}\ ms^{-1}$ (2) $5\ ms^{-1}$ (3) $10\ ms^{-1}$ (4) Zero

02. If two vectors $P = \hat{i} + 2m\hat{j} + m\hat{k}$ & $Q = 4\hat{i} - 2\hat{j} + m\hat{k}$. are perpendicular to each other, then find value of m.
    (1) m = 3   (2) m = 2   (3) m = 8   (4) m = 1

03. If all the particles have same kinetic energy. The relation between the wavelengths of alpha particle, electron and proton is :
    (1) $\lambda_\rho > \lambda_\alpha > \lambda_e$ (2) $\lambda_e > \lambda_\rho > \lambda_\alpha$
    (3) $\lambda_\alpha > \lambda_e > \lambda_\rho$ (4) $\lambda_\alpha > \lambda_\rho > \lambda_e$

04. Relation between time period of two satellites is $T_A = 2T_B$. Find ratio between radii of orbits
    (1) $4^{1/3}$ (2) $2^{1/3}$ (3) $3^{1/3}$ (4) $4^{2/3}$

05. During circular motion with constant angular acceleration, in 1st second, starting from rest covers 4 rotation. Then find number of rotation in next second.
    (1) 5   (2) 12   (3) 10   (4) 15

06. A particle of mass m is located in a field such that its potential energy is given by
    $U(x) = U_0(1 - \cos ax)$ where U_0 and a are positive constants. The period of small oscillations is

    (1) $2\pi\sqrt{\dfrac{U_0}{ma^2}}$ (2) $2\pi\sqrt{\dfrac{mU_0}{a^2}}$

    (3) $2\pi\sqrt{\dfrac{a_0}{mU_0}}$ (4) $2\pi\sqrt{\dfrac{m}{U_0a^2}}$

07. The specific resistance of the material of a wire is ρ and its volume is $3\ m^3$ and its resistance is 3Ω. The length of the wire will be (in meter)

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

08. Two infinite current carrying wires having current I in opposite directions are shown below. Find the magnetic field (in S.I. units) at point P.
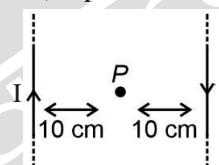
    (1) $\dfrac{7\mu_0 I}{\pi}$ (2) $\dfrac{10\mu_0 I}{\pi}$ (3) $\dfrac{5\mu_0 I}{\pi}$ (4) $\dfrac{\mu_0 I}{\pi}$

09. Dimensions of ohm are same as those of :
    (1) h/e (2) h^2/e (3) h/e^2 (4) h^2/e^2

10. When a piece of metal is illuminated by a monochromatic light of wavelength λ, then stopping potential is $3V_s$. When the same surface is illuminated by the light of wavelength 2λ, then stopping potential becomes V_s. The value of threshold wavelength for photoelectric emission will be

    (1) 4λ (2) 8λ (3) $\dfrac{4}{3}\lambda$ (4) 6λ

// CHEMISTRY //

11. For the third orbit of hydrogen atom, the angular momentum of electron will be

    (1) $\dfrac{5}{2}\dfrac{h}{\pi}$ (2) $\dfrac{3}{2}h$ (3) $\dfrac{3}{2}\dfrac{h}{\pi}$ (4) $\dfrac{5}{2}h$

12. Which of the following set of acid and base will give maximum heat of neutralisation?
    (1) $NaOH + HCl$ (2) $NaOH + CH_3COOH$
    (3) $NH_4OH + HCl$ (4) $CH_3COOH + NH_4OH$

13. Which of the following is a correct half cell reaction for bromine electrode $Pt(s)|Br_2(aq.)|Br^-(aq.)$

(1) $\frac{1}{2}Br_2(g) + e^- \rightarrow Br^-(g)$

(2) $Br^-(g) \rightarrow \frac{1}{2}Br_2(g) + e^-$

(3) $\frac{1}{2}Br_2(aq) + e^- \rightarrow Br^-(aq)$

(4) $Br^-(aq) \rightarrow \frac{1}{2}Br_2(aq) + e^-$

14. If 12 g of H_2 reacts with 28 g of N_2 to give ammonia. Then
   (1) H_2 is the limiting reagent
   (2) 6 g of H_2 is left
   (3) 8 g of H_2 is left
   (4) 17 g of NH_3 is formed

15. Which is the most suitable reagent for the following conversion?

$$CH_3 - CH = CH - CH_2 - \overset{\overset{O}{\|}}{C} - CH_3 \rightarrow$$

$$CH_3 - CH = CH - CH_2 - \overset{\overset{O}{\|}}{C} - OH$$

   (1) Tollens' reagent
   (2) Benzoyl peroxide
   (3) I_2 and NaOH solution
   (4) Sn and NaOH solution

16. Which of the following alkyl halides will undergo S_N1 reaction most readily?
   (1) $(CH_3)_3C - F$ (2) $(CH_3)_3C - Cl$
   (3) $(CH_3)_3C - Br$ (4) $(CH_3)_3C - I$

17. Arrange the following alkyl halides in decreasing order of the rate of β-elimination reaction with alcoholic KOH.

$$(A)\ CH_3 - \overset{\overset{H}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_2Br \quad (B)\ CH_3 - CH_2 - Br$$

   (C) $CH_3 - CH_2 - CH_2 - Br$
   (1) A > B > C   (2) C > B > A
   (3) B > C > A   (4) A > C > B

18. The correct order of atomic radii of group 13 elements is:
   (1) B < Al < Ga < In   (2) B < Ga < Al < In
   (3) B < Al < Ga ~ In   (4) B < Al ~ Ga > In

19. The rate constant for a first order reaction whose reaction rate is 0.06 M Sec^{-1} at 10 minutes and 0.02 M sec^{-1} at 20 minutes will be nearly:
   (1) $1.83 \times 10^{-3} sec^{-1}$ (2) $2.45 \times 10^{-3} sec^{-1}$
   (3) $3.42 \times 10^{-2} sec^{-1}$ (4) $1.45 \times 10^{-2} sec^{-1}$

20. Arrange the halogens F_2, Cl_2, Br_2, I_2 in order of their increasing reactivity with alkanes:
   (1) $I_2 < Br_2 < Cl_2 < F_2$ (2) $Br_2 < Cl_2 < F_2 < I_2$
   (3) $F_2 < Cl_2 < Br_2 < I_2$ (4) $Br_2 < I_2 < Cl_2 < F_2$

BOTANY

21. Choose correct statement–
   (1) Chlorella, a multicellular alga rich in protein
   (2) Chlorella & Spirulina are astronaut food because of their high carbohydrate, vitamin mineral but less protein
   (3) The product obtained by Gracilaria are used to grow microbes
   (4) Laminaria, Sargassum a member of Rhodophyceae are among 70 species of marine algae used as food

22. Meristem that occur in mature region of root and shoot of plant-
   (1) Apical meristem   (2) Intercalary meristem
   (3) Lateral meristem   (4) None of these

23. Assertion – Chloroplasts usually align themselves along the walls of mesophyll cells.
   Reason – They get optimum quantity of incident light by aligning along well.
   Choose the correct option.
   (1) Assertion and Reason are correct and Reason is correct explanation for Assertion
   (2) Assertion and Reason are correct but is not the explanation of Assertion
   (3) Assertion and Reason are both incorrect
   (4) Assertion is correct but Reason is incorrect

24. What is the function of cytochrome c?
   (1) Act as donor of electron
   (2) Passage for movement of e^-
   (3) Act as a receptor of e^- between complex II and III
   (4) Act as a mobile carrier for e^- transfer between complex III and IV

25. In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F_1 generation, pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers.
   Choose the incorrect statement from the following.
   (1) The experiment does not follow the principle of dominance.
   (2) Pink colour in F1 is due to incomplete dominance.
   (3) Ratio of F_2 is ¼ (Red): 2/4 (Pink): ¼ (white).
   (4) Law of segregation does not apply in this experiment.

26. What is coding strand of given template strand
   3' – AGCATGCA – 5'
   (1) 5' – TCGTACGT – 3'
   (2) 5' – UACGUACGU – 3'
   (3) 3' – UACGUACGU – 5'
   (4) 3' – TACGTACGT – 5'

27. VNTR belongs to-
   (1) Micro-satellite (2) Macro-satellite
   (3) Mini-satellite   (4) All of these

28. Match the following-

	Species		% of threat of extinction
a.	Birds	1.	23%
b.	Mammals	2.	32%
c.	Amphibians	3.	12%
d.	Gymnosperms	4.	31%

   (1) a–1, b–3, c–2, d–4   (2) a–3, b–1, c–2, d–4
   (3) a–3, b–1, c–4, d–2   (4) a–3, b–4, c–1, d–2

29. _____ is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis
   (1) Gross primary productivity
   (2) Primary production
   (3) Secondary production
   (4) None of these

30. Assertion: Complexity of classification increases from kingdom to species.
   Reason: Common characters increase from kingdom to species.
   (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
   (2) The Assertion and Reason are true but Reason is not the correct explanation of Assertion.
   (3) Assertion is true but Reason is false.
   (4) Assertion is false but Reason is true.

31. Petals of a flower are arranged in such a way that each overlaps a petal on one side and is overlapped by other petal on the other side. The aestivation is
   (1) Valvate   (2) Quincuncial
   (3) Imbricate   (4) Twisted

32. Assertion: Mendel proposed the law of independent assortment on the basis of results of dihybrid cross.
   Reason: When two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters.
   (1) Both assertion and reason are true and the reason is the correct explanation of assertion.
   (2) Both assertion and reason are true but the reason is not the correct explanation of assertion.
   (3) Assertion is true but reason is false.
   (4) Both assertion and reason are false.

33. Which of the following statement(s) is/are correct about self-incompatibility?
   (i) It is a device to prevent inbreeding.
   (ii) It provides a biochemical block to self-fertilization.
   (iii) It ensures cross-fertilization.
   (iv) It is governed by pollen-pistil interaction.
   (v) It is governed by series of multiple alleles.
   (vi) It prevents self-pollen (from the same flower or other flowers of the same plant) from fertilizing the ovules by inhibiting pollen germination of pollen tube growth in the pistil.
   (1) (i), (ii) and (iii)
   (2) (i), (iv) and (v)
   (3) All of the above
   (4) None of the above

34. Pledge of Earth Summit held in Rio de Janeiro.
   (1) All nations to take appropriate measure for conservation of biodiversity and sustainable utilization of its benefit.
   (2) All nations are free to utilize natural resources and also harm the ecosystem.
   (3) Significant reduction in the current rate of biodiversity loss at global, regional and local levels.
   (4) None of these

35. Select the correct matches:
   (a) S-phase-DNA replication
   (b) Zygotene-Synapsis
   (c) Diplotene-Crossing over
   (d) Meiosis-Both haploid and diploid cells
   (e) Gap 2 phase-Quiescent stage
   (1) (a) and (b)   (2) (c) and (d)
   (3) (c) and (e)   (4) (a), (c) and (e)

ZOOLOGY

36. Sickle-cell anaemia happens due to ...A... mutation in which ...B... of haemoglobin is affected.
   Fill the correct option for A and B.
   (1) A-point; B-β-chain
   (2) A-chromosomal; B-α-chain
   (3) A-allele; B-α chain
   (4) A-non-allele; B-chain

37. Fill up the blanks.
   I. The period between ....A....years of age may be thought of as adolescence period.
   II. Adolescence is a bridge linking ....B..... and ....C....
   III. The chronic use of drug and alcohol damages ...D.... and ...E...
   IV. The alcoholism during ....F.... affects the foetus.
   (1) A-12-18, B-childhood, C-adulthood, D-central nervous system, E-liver, F-pregnancy
   (2) A-10-15, B-childhood, C-adulthood, E-stomach, F-adulthood
   (3) A-15-20, B-adulthood, C-adulthood, D-liver, E-kidney, F-pregnancy D-heart,
   (4) A-20-28, B-adulthood, C-adulthood, D-liver, E-central nervous system, F-pregnancy

38. Read the following statements carefully and choose correct statements.

(1) During the joint diastole, bicuspid and tricuspid valve remains closed.

(2) The valves in the heart allows the flow of blood only in one direction, i.e., from the ventricles to the atria.

(3) Each peak in the ECG is identified with a letter from P to T that corresponds to a specific neural activity of the brain.

(4) During atrial systole, left atria pumps blood with more pressure than the right atria.

39. Colour blind man marries a normal female whose father was colour blind, then Percentage of daughters becoming haemophiliac shall be:
(1) 100%   (2) 50%
(3) 75%   (4) 25%

40. Given below the diagram of internal organs of frog. Identify A to F.
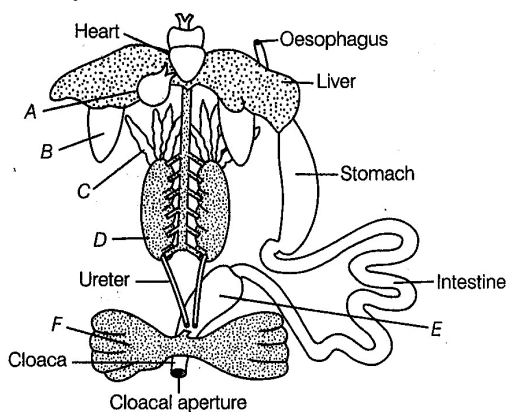
(1) A-Gall bladder, B-Lungs, C-Testis, D-Kidney, E-Urethra, F-Urinary bladder
(2) A-Gall bladder, B-Lungs, C-Fat bodies, D-Kidney, E-Rectum, F-Urinary bladder
(3) A-Gall bladder, B-Lungs, C-Ovary, D-Kidney, E-Ileum, F-Urinary bladder
(4) A-Gall bladder, B-Lungs, C-Fat bodies, D-Kidney, E-Colon, F-Urinary bladder

41. Consider the statements as True/False.
I. The axoplasm inside the axon contains high concentration of K^+ and negatively charged proteins.
II. The axoplasm inside the axon contains low concentration of Na^+.
III. The fluid outside the axon contains a low concentration of K^+.
IV. The fluid outside the axon contains a low concentration of Na^+ and negatively charged proteins.
The correct option is
(1) I-True, II-False, III-False, IV-True
(2) I-True, II-True, III-False, IV-False
(3) I-True, II-True, III-True, IV-False
(4) I-False, II-True, III-False, IV-False

42. Thalamus, a structure wrapped by cerebrum, is
(1) a major centre for motor signaling only
(2) a major co-ordinating centre for sensory and motor signaling
(3) a major co-ordinating centre for sensory signal only
(4) not a nervous part of a brain

43. The second maturation division of the mammalian ovum occurs
(1) shortly after ovulation before the ovum makes entry into the Fallopian tube
(2) until/after the ovum has been penetrated by a sperm
(3) until the nucleus of the sperm has fused with that of the ovum
(4) in the Graafian follicle following the first maturation division

44. Identify the correct statements about respiratory system of cockroach.
I. The trachea receives air through 10 pairs of spiracles.
II. The spiracles always remain open.
III. The opening of spiracles are regulated by sphincter.
IV. Exchange of gases take place at the tracheoles by diffusion.
Choose the correct answer from the options given below.
(1) I, II and III   (2) I, III and IV
(3) II and III   (4) III and IV

45. What will happen if the blood becomes acidic?
(1) Association of O_2 and Hb will increase.
(2) RBC formation will increase.
(3) Association of O_2 and Hb will decrease.
(4) Neither O_2 association nor RBC number will increase.

46. Which of the following statements is false?
(1) Scapula has the spine which projects as acromion process.
(2) Below acromion process is a glenoid cavity.
(3) Each clavicle (collar bone) articulates with acromion.
(4) Clavicle is long S-shaped bone with 4 curvatures.

47. Which of these is not homeotherm?
(1) Aptenodytes   (2) Testudo
(3) Delphinus   (4) Neophron

48. **Statement I:** Without leydig cells, the functions of male sex accessory ducts and glands cannot be maintained.
Statement II: Spermiogenesis is the last stage of spermatogenesis.
(1) Both Statements I and II are incorrect.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Both Statements I and II are correct.

49. **Statement I:** According to Darwin, existing life forms share similarities to varying degrees not only to themselves, but also with life forms that existed millions of years ago.
Statement II: Natural selection and branching descent are the key concept of Darwinian theory of evolution.
(1) Both Statements I and II are incorrect.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Both Statements I and II are correct.

50 **Statement I:** Striated muscles get fatigued due to the production of lactic acid.
Statement II: Myofibril is absent in striated muscles.
(1) Both Statements I and II are incorrect.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Both Statements I and II are correct.