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SAMPLE PAPER - 128

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

PHYSICS

01. A 1500 kg car moving on a flat road negotiates a curve whose radius is 35 m. If the coefficient of static friction between the tyres and the dry pavement is 0.5, then find the maximum speed the car can have in order to take turn successfully?
(1) 13.1 m/s (2) 15.1 m/s
(3) 20 m/s (4) 25 m/s

02. A monoatomic gas at a pressure P, having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16 V. The final pressure of the gas is : (take $\gamma = \frac{5}{3}$)

(1) 64P (2) 32P (3) $\frac{P}{64}$ (4) 16P

03. If a satellite is moving around the earth in an orbit of 5R radius, here R = radius of the earth. The minimum kinetic energy required to be provided to the satellite such that it escapes the gravitational field of the earth is (M and m are masses of earth and satellite respectively)
(1) $\frac{GMm}{5R}$ (2) $\frac{GMm}{15R}$ (3) $\frac{GMm}{10R}$ (4) $\frac{GMm}{\sqrt{2}R}$

04. A horizontal spring-block system of mass 2 kg executes S.H.M. When the block is passing through its equilibrium position, an object of mass 1 kg is put on it and the two move together. The new amplitude of vibration is (A being its initial amplitude):

(1) $\sqrt{\frac{2}{3}}$ A (2) $\sqrt{\frac{3}{2}}$ A

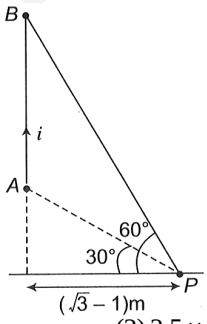
(3) $\sqrt{2}$ A (4) $\frac{A}{\sqrt{2}}$

05. Two point charges +8q and –2q are located at x = 0 and x = L respectively. The location of a point on the x-axis at which the net electric field due to these two point charges is zero is

(1) 8 L (2) 4 L (3) 2 L (4) $\frac{L}{4}$

06. A galvanometer gives full deflection when a current of 2 amp. flows through it. The resistance of galvanometer is 12 ohms. If the same galvanometer is to be used for measuring a maximum current of 5 amp., then the galvanometer must be connected with a resistance of
(1) 8 ohms in series (2) 18 ohms in series
(3) 8 ohms in parallel (4) 18 ohms in parallel

07. A straight wire current element is carrying current 100 A, as shown in figure. The magnitude of magnetic field at point P which is at perpendicular distance $(\sqrt{3}-1)$ m from the current element if end A and end B of the element subtend angle 30° and 60° at point P, as shown, is:

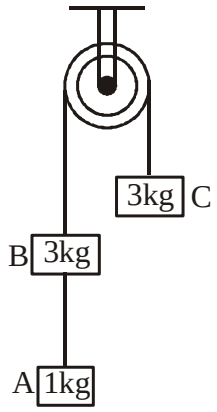


(1) 5×10^{-6} T (2) 2.5×10^{-6} T
(3) 2.5×10^{-5} T (4) 8×10^{5} T

08. A wave travelling in the +ve x-direction having displacement along y-direction as 1 m, wavelength 2π m and frequency of $\frac{1}{\pi}$ Hz is represented by

(1) $y = \sin(x - 2t)$
(2) $y = \sin(2\pi x - 2\pi t)$
(3) $y = \sin(10\pi x - 20\pi t)$
(4) $y = \sin(2\pi x + 2\pi t)$

09. In the system shown in the figure, the acceleration of the 1 kg mass and the tension in the string connecting between A and B, respectively, are



(1) $\frac{g}{4}$ downwards, $\frac{8g}{7}$

(2) $\frac{g}{4}$ upwards, $\frac{g}{7}$

(3) $\frac{g}{7}$ downwards, $\frac{6}{7}g$

(4) $\frac{g}{2}$ upwards, g

10. Efficiency of carnot cycle is 25% when temperature of sink is 27°C. Find change in temperature of source if efficiency is increased by 100%.
(1) 100 K (2) 200 K (3) 300 K (4) 400 K

11. Two planets have masses M and 16M and their radii are a and 2a, respectively. The separation between the centres of the planets is 10 a. A body of mass m is fired from the surface of the larger planet towards the smaller planet along the line joining their centres. For the body to be able to reach at the surface of smaller planet, the minimum firing speed needed is

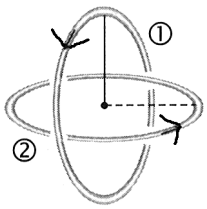
(1) $\frac{3}{2}\sqrt{\frac{5GM}{a}}$ (2) $\sqrt{\frac{GM^2}{ma}}$

(3) $2\sqrt{\frac{GM}{a}}$ (4) $4\sqrt{\frac{GM}{a}}$

12. A capacitor of capacitance 2 μF is connected in the tank circuit of an oscillator oscillating with a frequency of 1 kHz. If the current flowing in the circuit is 2 mA, the voltage across the capacitor will be
(1) 0.32 V (2) 0.16 V
(3) 79.5 V (4) 159 V

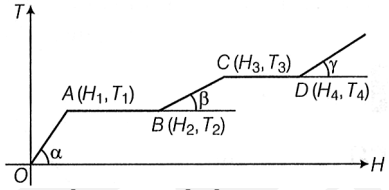
13. The two metallic plates of radius r are placed at a distance d apart and its capacity is C. If a plate of radius r/2 and thickness d of dielectric constant 6 is placed between the plates of the condenser, then its capacity will be
(1) 7C/3 (2) 3C/7
(3) 3C/4 (4) 9C/4

14. Two similar coils are kept mutually perpendicular such that their centres coincide. At the centre, find the ratio of the magnetic field due to one coil and the resultant magnetic field by both coils, if the same current is flown



(1) $1:\sqrt{2}$ (2) 1 : 2 (3) 2 : 1 (4) $\sqrt{3}:1$

15. The graph shows variation of temperature (T) of one kilogram of a material with the heat supplied (H) to it. At O the substance is in the solid state



Fro the graph, we conclude
(1) T_4 is melting point of the solid
(2) BC represents the change of state from solid to liquid
(3) $H_2 - H_1$ represents the latent heat fusion of the substance
(4) $H_3 - H_1$ represents the latent heat of vaporisation of the liquid

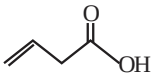
CHEMISTRY

16. The number of σ and π bonds present in 1,3-butadiene are respectively :
(1) 8 and 1 (2) 8 and 2 (3) 9 and 1 (4) 9 and 2

17. Acetone + dil. NaOH $\xrightarrow{\text{Heat}}$?
(1) Crotonaldehyde (2) Mesitylene
(3) Mesityl oxide (4) All

18. Only sp and sp^2 hybrid orbitals are involved in the formation of:
(1) $CH_3 - CH = CH_2$ (2) $CH_3 - CH_3$
(3) $CH_3 - C \equiv CH$ (4) $H_2C = C = CH_2$

19. $CH_3 - CH_2 - CH_2 - OH \xrightarrow[170°C]{conc.H_2SO_4} A \xrightarrow{HBr} B \xrightarrow[KOH(\Delta)]{alcoholic} C \xrightarrow{H^+OH^-,H^+} D$. D is?
(1) n-propyl alcohol (2) Propyl chloride
(3) Propan-2-ol (4) isopropyl chloride

20. The IUPAC name of  is :

(1) prop-2-enoic acid (2) but-1-enoic acid
(3) but-3-enoic acid (4) pent-4-enoic acid

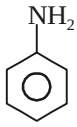
21. Which will not give iodoform test.

(1) $CH_3–CH_2OH$

(2) $CH_3-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-CH_3$

(3) $CH_3-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$

(4) $CH_3-\underset{\displaystyle O}{\underset{\|}{C}}-CH_3$

22.  $\xrightarrow{NaNO_2/HCl}$ A $\xrightarrow{Cu/HCl}$ B

$\xrightarrow[\substack{\text{pressure}\\(ii)\ H^+}]{(i)\ NaOH+623K}$ C $\xrightarrow{CCl_4/KOH}$ D $\xrightarrow{CH_3COCl}$ E, E is.

(1) Phenol
(2) Benzene
(3) Cresol
(4) Acetyl sallicycllic acid (Aspirin)

23. The number of possible alkynes with molecular formula, C_5H_8 is:

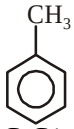
(1) 2 (2) 3 (3) 4 (4) 5

24. The number of structural isomers possible from the molecular formula C_3H_9N is :

(1) 5 (2) 4 (3) 3 (4) 2

25.  $\xrightarrow[conc.H_2SO_4]{conc.HNO_3}$ A $\xrightarrow{Sn/HCl}$ B $\xrightarrow{NaNO_2/HCl}$ C $\xrightarrow{H_3PO_2}$ D $\xrightarrow{O_3/Zn/H_2O}$ E, E is

(1) Benzene (2) Acetaldehyde
(3) Glyoxal (4) Phenol

26.  $\xrightarrow{KMnO_4/H^+}$ A $\xrightarrow{NH_3+Heat}$ B $\xrightarrow{Br_2/KOH}$ C, C is.

(1) Aniline (2) Benzylamine
(3) Both (4) None

27. Which among the following is not a state function?

(1) Pressure (2) Volume
(3) Internal energy (4) Heat

28. All natural processes are

(1) Spontaneous and irreversible
(2) Spontaneous and reversible
(3) Non-spontaneous and reversible
(4) Non-spontaneous and irreversible

29. In which of the following expression the concentration of the solution remains independent of temperature:

(1) Molarity
(2) Normality
(3) Mole fraction
(4) Percentage strength (w/v)

30. Number of moles in 36 mL water are:

(1) 2 mol (2) $\frac{36\times10^{-3}}{22.4}$ mol

(3) 1 mol (4) $\frac{2\times10^{-3}}{22.4}$ mol

BOTANY

31. A nucleoside is formed through a N-glycosidic linkage by joining

(1) Phosphate group with nitrogen base
(2) Nitrogen base with nitrogen base
(3) Nitrogen base with pentose sugar
(4) Pentose sugar with phosphate group

32. Experiment that proved DNA to be genetic material of bacteriophage was performed by

(1) Beadle and Tatum
(2) Hershey and Chase
(3) Schleiden and Schwann
(4) Weismann

33. Heterogeneous nuclear RNA is converted into mRNA by

(1) Splicing (2) Capping
(3) Tailing (4) All the above

34. Number of triplet codons having all three bases same in 64 triplet codons is

(1) 8 (2) 6
(3) 4 (4) 2

35. Match List-l with List-II.

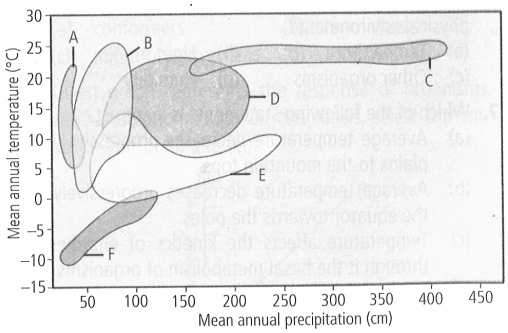
	List-I		List-II
A.	Formation of pyruvate	i.	Mitochondria
B.	Aerobic respiration in eukaryotes	ii.	Cytosol
C.	Kreb's cycle	iii.	Inner membrane of mitochondira.
D.	ETS	iv.	Outer surface of inner mitochondrial membrane.

Choose the correct answer from the options given below

(1) A–II, B–I, C–IV, D–III
(2) A–I, B–II, C–III, D–VI
(3) A–III, B–IV, C–I, D–II
(4) A–II, B–IV, C–I, D–III

36. Productivity at the second trophic level is always
(1) greater than the productivity at the first trophic level
(2) less than the productivity at the first trophic level
(3) equal to the productivity at the first trophic level
(4) extremely variable compared to the productivity at the first trophic level.

37. In the given figure, identify the temperate forest and coniferous forest respectively from the markings A–F and select the correct option.



(1) A and B (2) B and D
(3) D and E (4) C and F

38 In which phase of cell cycle, semi-autonomous organelles duplicate?
(1) Pre mitotic phase / post synthetic
(2) post growth 1 / Synthetic phase
(3) Post mitotic phase / Pre synthetic
(4) Mitotic phase

39. Which of the following represents the edible swollen portion of Allium cepa?
(1) Aerial stem (2) Roots
(3) Internodes (4) Leaf bases

40. Match the columns I and II, and choose the correct combination from the options given.

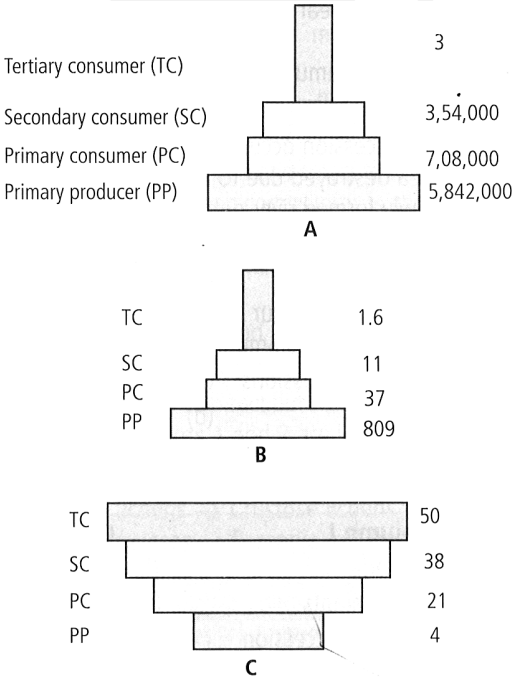
	Column-I		Column-II
A.	Thymine	i.	ds DNA
B.	Inverted 'L' like	ii.	5-methyl uracil
C.	Chargaff's rule	iii.	H-bonds
D.	Antiparallalty of DNA is due to	iv.	Transfer RNA

(1) A–i; B–iii; C–iv; D–ii
(2) A–ii; B–iv; C–i; D–iii
(3) A–i; B–ii; C–iii; D–iv
(4) A–i; B–iii; C–ii; D–iv

41. In a dihybrid cross AABB × aabb, F_2 progeny of AABB, AABb, AaBB and AaBb occurs in the ratio of
(1) 1 : 1 : 1 : 1 (2) 9 : 3 : 3 : 1
(3) 1 : 2 : 2 : 1 (4) 1 : 2 : 2 : 4

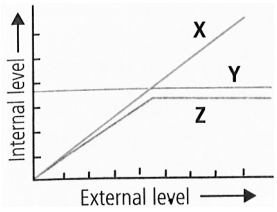
42. Identify the correct statements.
I. In gymnosperms, microspores and megaspores are produced in microsporangia and megasporangia, respectively that are borne on the sporophylls.
II. Bentham and Hooker's natural classification system considers not only the internal features, but also the external features.
III. In pteridophytes, zygote develops into young embryos within the female gametophyte and this event is the precursor to the seed habit and considered as an important step in evolution.
IV. The sporophyte in Marchantia is more elaborate than that in Polytrichum.
V. In bryophytes, sporophyte is free-living, but attached to the photosynthetic gametophyte and derives nourishment from it.
Choose the correct answer from the options given below
(1) I, II and IV (2) I, IV and V
(3) I, II and III (4) I, III and V

43. Study the following ecological pyramids carefully.



Match the following statements (i), (ii) and (iii) with given pyramids A, B and C and select the correct answer.
(i) Inverted pyramid of biomass depicting small standing crop of phytoplanktons supporting a large standing crop of zooplanktons
(ii) Pyramid of numbers in a grassland ecosystem showing about 6 million producers
(iii) Upright pyramid of biomass
(1) A–(ii), B–(iii), C–(i) (2) A–(ii), B–(i), C–(iii)
(3) A–(i), B–(iii), C–(ii) (4) A–(i), B–(ii), C–(iii)

44. The given graph represents how three different living organisms (X, Y and Z) cope with the external environmental conditions. Study the graph and select the correct option regarding X, Y and Z



(1) X could be a mammal (2) Y could be a bird
(3) Z could be a human (4) Y could be a frog

45. Taxon and category differ in

(1) Taxon is recognised and assigned while category is abstract

(2) Taxon is a group of real organisms while category is a rank or level in a hierarchy

(3) Both (1) and (2)

(4) None of these

ZOOLOGY

46. Fill in the blanks with the appropriate option I or II for animals belonging to class-Cyclostomata.
I. Gill slits are ...A.....
II. Jaws are ...B....
III. Scales and paired fins are ...C....
IV. Open circulatory system is...D....
V. Vertebral column is...E.....
I-Absent II-Present
(1) A-II, B-II, C-II, D-I, E-II
(2) A-I, B-II, C-I, D-II, E-II
(3) A-II, B-I, C-I, D-I, E-II
(4) A-I, B-I, C-II, D-II, E-II

47. The animals belonging to phylum-Annelida use the following in locomotion.
(1) Nephridia and nephridial pores
(2) Longitudinal and circular muscles
(3) Organs of bursa
(4) Spicules and ostia

48. Fill up the blanks by choosing correct combination of A, B, C and D.
I. The ...A... is made up of a single thin layer of flattened cells with irregular boundaries.
II. ...B... gland secrete digestive enzyme.
III. ...C... provide protection against chemical and mechanical stresses.
IV. Cell junctions are found in ...D...
(1) A-Cuboidal epithelium, B-Endocrine, C-Columnar epithelium, D-Connective tissue
(2) A-Squamous epithelium, B-Exocrine, C- Compound Epithelium, D-Epithelial tissue
(3) A-Columnar epithelium, B-Liver, C-Epithelial tissue, D-Muscular tissue
(4) A-Ciliated epithelium, B-Exocrine, C-Connective tissue, D-Nervous tissue

49. Male frog can be distinguished from female frog due to the presence of
(1) vocal sacs and copulatory pad on the first digit of the forelimb
(2) a neck and tail is absent
(3) the hind limb ends in the five digits
(4) eyes are bulged and are covered by the nictitating membrane

50. I. Hypothyroidism causes irregularity of menstrual cycle.
II. Hyperthyroidism adversely affects the body physiology.
III. Hypothyroidism cause cretinism.
IV. Hypothyroidism causes goitre.
Which of the above statements are correct?
Choose the correct option.
(1) III and IV (2) I, II and IV
(3) I, II and III (4) All of these

51. Consider the following statements.
I. The property of metastasis is shown by malignant tumours.
II. Carcinogens are the agents that causes cancer.
III. Benign tumour causes little damage to body cells.
Which of the statements given above are correct?
(1) I and II
(2) I and III
(3) II and III
(4) I, II and III

52. Match the following columns.

	Column I		Column II
A	Opioids	1.	Interact with receptors present mainly in the brain.
B	Cannabinoids	2.	Bind to opioid receptors in the central nervous system.
C	Cocaine	3.	Interferes with the transport of the neurotransmitter.
D	Atropa belladona	4.	Plant with hallucinogenic properties.

(1) A-2, B-1, C-3, D-4 (2) A-1, B-3, C-4, D-2
(3) A-3, B-3, C-2, D-1 (4) A-4, B-2, C-1, D-3

53. In recombinant DNA technology, a plasmid vector is cleaved by
(1) modified DNA ligase.
(2) a heated alkaline solution.
(3) the same enzyme that cleaves donor DNA.
(4) an enzyme different from one that cleaves donor DNA.

54. Which of the following statements is incorrect?
(1) Specific Bt toxin genes have been isolated from Bacillus thuringiensis.
(2) Meloidogyne incognitis does not infect the roots of tobacco plants.
(3) In mammals, insulin is synthesised as a prohormone.
(4) ADA deficiency can be cured by bone marrow transplantation.

55. Which of the following statements is false regarding proteins?
(1) A protein is heteropolymer and not a homo- polymer.
(2) Collagen is the most abundant protein in the animal world.
(3) RuBisCO is the most abundant protein in the whole biosphere.
(4) The first amino acid in the polypeptide chain is called C-terminal amino acid and the last amino acid is called N-terminal amino acid.

56. RNAi process takes place in
(1) Prokaryotes
(2) Unicellular eukaryotes only
(3) Multicellular eukaryote only
(4) All eukaryotes

57. The transfer of sprms into a female genital tract is called
(1) Insemination (2) Gametogenesis
(3) Fertilization (4) Gestation

58. Examples of specialised connective tissue is/are
(1) bone (2) cartilage
(3) blood (4) All of these

59. Given below is a table comparing the effects of sympathetic and parasympathetic nervous system for four features (a-d). Which one feature is correctly described?

	Feature	Sympathetic Nervous System	Parasympathetic Nervous System
(1)	Salivary gland	Stimulates secretion	Inhibits secretion
(2)	Pupil of the eye	Dilates	Constricts
(3)	Heart rate	Decreases	Increases
(4)	Intestinal peristalsis	Stimulates	Inhibits

60. One of the roles of the countercurrent mechanism in the nephron is to
(1) produce a urea gradient that will promote the diffusion of urea into the collecting tubule.
(2) produce a glucose gradient that will facilitate the reabsorption of glucose.
(3) produce a salt gradient that will allow the kidney to retain salt ions.
(4) produce a concentration gradient that will allow the nephron to concentrate filtrate.