# ACHLA

Test Booklet Code

**BB**

*This Booklet contains 24 pages.*

**Do not open this Test Booklet until you are asked to do so.**

**Read carefully the Instructions on the Back Cover of this Test Booklet.**

***Important Instructions :***

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **Side-1** and **Side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and this Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4 marks**. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are 720.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **BB**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
8. Use of white fluid for correction is ***not*** permissible on the Answer Sheet.

Unique Pub International
UPI
UPIQPBANK.COM

1. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is

(1) Geometrical isomerism
(2) Linkage isomerism
(3) Ionization isomerism
(4) Coordination isomerism

2. Which one of the following ions exhibits d-d transition and paramagnetism as well ?

(1) $CrO_4^{2-}$
(2) $MnO_4^{2-}$
(3) $MnO_4^{-}$
(4) $Cr_2O_7^{2-}$

3. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the ***correct*** code :

| | *Column I* | | *Column II* |
|---|---|---|---|
| a. | $Co^{3+}$ | i. | $\sqrt{8}$ B.M. |
| b. | $Cr^{3+}$ | ii. | $\sqrt{35}$ B.M. |
| c. | $Fe^{3+}$ | iii. | $\sqrt{3}$ B.M. |
| d. | $Ni^{2+}$ | iv. | $\sqrt{24}$ B.M. |
| | | v. | $\sqrt{15}$ B.M. |

| | a | b | c | d |
|---|---|---|---|---|
| (1) | iv | v | ii | i |
| (2) | iii | v | i | ii |
| (3) | iv | i | ii | iii |
| (4) | i | ii | iii | iv |

4. Iron carbonyl, $Fe(CO)_5$ is

(1) tetranuclear
(2) dinuclear
(3) trinuclear
(4) mononuclear

5. The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are

(1) square planar geometry and diamagnetic
(2) tetrahedral geometry and paramagnetic
(3) square planar geometry and paramagnetic
(4) tetrahedral geometry and diamagnetic

6. The correct order of N-compounds in its decreasing order of oxidation states is

(1) $HNO_3$, NO, $N_2$, $NH_4Cl$
(2) $NH_4Cl$, $N_2$, NO, $HNO_3$
(3) $HNO_3$, $NH_4Cl$, NO, $N_2$
(4) $HNO_3$, NO, $NH_4Cl$, $N_2$

7. Which one of the following elements is unable to form $MF_6^{3-}$ ion ?

(1) Ga
(2) In
(3) B
(4) Al

8. Considering Ellingham diagram, which of the following metals can be used to reduce alumina ?

(1) Fe
(2) Cu
(3) Mg
(4) Zn

9. The correct order of atomic radii in group 13 elements is

(1) B < Al < In < Ga < Tl
(2) B < Ga < Al < In < Tl
(3) B < Ga < Al < Tl < In
(4) B < Al < Ga < In < Tl

10. Which of the following statements is ***not*** true for halogens ?

(1) All form monobasic oxyacids.
(2) Chlorine has the highest electron-gain enthalpy.
(3) All but fluorine show positive oxidation states.
(4) All are oxidizing agents.

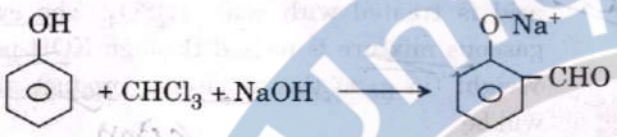
11. In the structure of $ClF_3$, the number of lone pairs of electrons on central atom 'Cl' is

(1) one
(2) three
(3) four
(4) two



SPACE FOR ROUGH WORK

12. In the reaction



the electrophile involved is

(1) dichloromethyl cation ($\overset{\oplus}{C}HCl_2$)

(2) dichlorocarbene ($:CCl_2$)

(3) dichloromethyl anion ($\overset{\ominus}{C}HCl_2$)

(4) formyl cation ($\overset{\oplus}{C}HO$)

13. Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their

(1) formation of intramolecular H-bonding

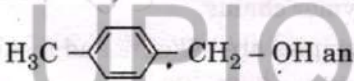
(2) formation of intermolecular H-bonding

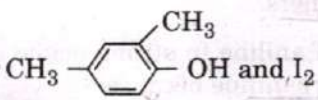
(3) more extensive association of carboxylic acid via van der Waals force of attraction

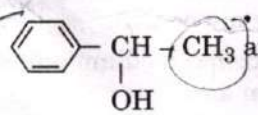
(4) formation of carboxylate ion

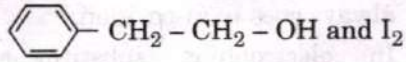
14. Compound A, $C_8H_{10}O$, is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with characteristic smell.

A and Y are respectively

(1)  and $I_2$

(2)  and $I_2$

(3)  and $I_2$

(4)  and $I_2$

15. Which oxide of nitrogen is ***not*** a common pollutant introduced into the atmosphere both due to natural and human activity ?

(1) $N_2O_5$

(2) NO

(3) $N_2O$

(4) $NO_2$

16. The compound A on treatment with Na gives B, and with $PCl_5$ gives C. B and C react together to give diethyl ether. A, B and C are in the order

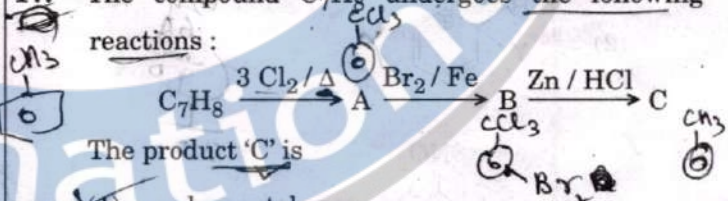
(1) $C_2H_5OH$, $C_2H_6$, $C_2H_5Cl$

(2) $C_2H_5OH$, $C_2H_5ONa$, $C_2H_5Cl$

(3) $C_2H_5Cl$, $C_2H_6$, $C_2H_5OH$

(4) $C_2H_5OH$, $C_2H_5Cl$, $C_2H_5ONa$

17. The compound $C_7H_8$ undergoes the following reactions :



The product 'C' is

(1) *m*-bromotoluene

(2) *p*-bromotoluene

(3) 3-bromo-2,4,6-trichlorotoluene

(4) *o*-bromotoluene

18. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is

(1) $CH \equiv CH$

(2) $CH_4$

(3) $CH_3 - CH_3$

(4) $CH_2 = CH_2$

UPIQPBANK.COM



SPACE FOR ROUGH WORK

19. Which of the following molecules represents the order of hybridisation $sp^2$, $sp^2$, sp, sp from left to right atoms ?

(1) $HC \equiv C - C \equiv CH$

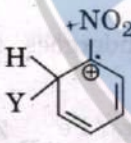
(2) $CH_3 - CH = CH - CH_3$

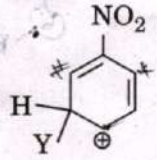
(3) $CH_2 = CH - CH = CH_2$

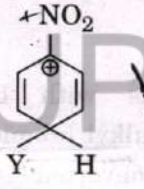
(4) $CH_2 = CH - C \equiv CH$

20. Which of the following carbocations is expected to be most stable ?

(1)

(2) 

(3) 

(4) 

21. Which of the following is correct with respect to – I effect of the substituents ? (R = alkyl)

(1) $-NH_2 < -OR < -F$

(2) $-NR_2 > -OR > -F$

(3) $-NH_2 > -OR > -F$

(4) $-NR_2 < -OR < -F$

22. A mixture of 2·3 g formic acid and 4·5 g oxalic acid is treated with conc. $H_2SO_4$. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be

(1) 1·4

(2) 4·4

(3) 2·8

(4) 3·0

23. The difference between amylose and amylopectin is

(1) Amylopectin have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ α-linkage

(2) Amylose is made up of glucose and galactose

(3) Amylopectin have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ β-linkage

(4) Amylose have $1 \rightarrow 4$ α-linkage and $1 \rightarrow 6$ β-linkage

24. Which of the following compounds can form a zwitterion ?

(1) Aniline

(2) Glycine

(3) Benzoic acid

(4) Acetanilide

25. Regarding cross-linked or network polymers, which of the following statements is ***incorrect*** ?

(1) They contain covalent bonds between various linear polymer chains.

(2) They contain strong covalent bonds in their polymer chains.

(3) Examples are bakelite and melamine.

(4) They are formed from bi- and tri-functional monomers.

26. Nitration of aniline in strong acidic medium also gives m-nitroaniline because

(1) In spite of substituents nitro group always goes to only m-position.

(2) In acidic (strong) medium aniline is present as anilinium ion.

(3) In absence of substituents nitro group always goes to m-position.

(4) In electrophilic substitution reactions amino group is meta directive.

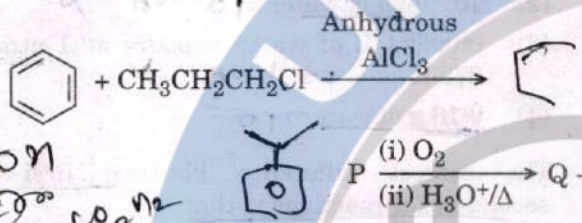


SPACE FOR ROUGH WORK

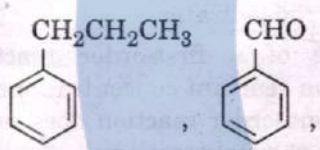


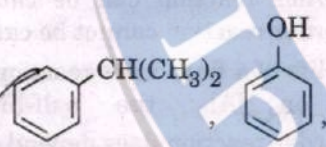
UPIQPBANK.COM

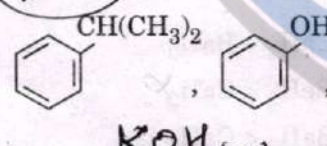
27. Identify the major products P, Q and R in the following sequence of reactions :

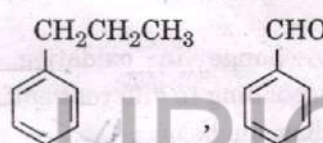



P Q R

(1) 


(2) 


(3) 


(4) 


28. Which of the following oxides is most acidic in nature ?

(1) MgO
(2) CaO
(3) BaO
(4) BeO

29. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations :

a. 60 mL $\frac{M}{10}$ HCl + 40 mL $\frac{M}{10}$ NaOH

b. 55 mL $\frac{M}{10}$ HCl + 45 mL $\frac{M}{10}$ NaOH

c. 75 mL $\frac{M}{5}$ HCl + 25 mL $\frac{M}{5}$ NaOH

d. 100 mL $\frac{M}{10}$ HCl + 100 mL $\frac{M}{10}$ NaOH

pH of which one of them will be equal to 1 ?

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

30. On which of the following properties does the coagulating power of an ion depend ?

(1) The magnitude of the charge on the ion alone
(2) The sign of charge on the ion alone
(3) Both magnitude and sign of the charge on the ion
(4) Size of the ion alone

31. Given van der Waals constant for $NH_3$, $H_2$, $O_2$ and $CO_2$ are respectively 4·17, 0·244, 1·36 and 3·59, which one of the following gases is most easily liquefied ?

(1) $NH_3$
(2) $CO_2$
(3) $O_2$
(4) $H_2$

32. The solubility of $BaSO_4$ in water is $2{\cdot}42 \times 10^{-3}$ $gL^{-1}$ at 298 K. The value of its solubility product ($K_{sp}$) will be

(Given molar mass of $BaSO_4$ = 233 g $mol^{-1}$)

(1) $1{\cdot}08 \times 10^{-10}$ $mol^2\ L^{-2}$
(2) $1{\cdot}08 \times 10^{-8}$ $mol^2\ L^{-2}$
(3) $1{\cdot}08 \times 10^{-14}$ $mol^2\ L^{-2}$
(4) $1{\cdot}08 \times 10^{-12}$ $mol^2\ L^{-2}$

UPIQPBANK.COM



SPACE FOR ROUGH WORK

**33.** For the redox reaction

$MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$

the correct coefficients of the reactants for the balanced equation are

| | $MnO_4^-$ | $C_2O_4^{2-}$ | $H^+$ |
|---|---|---|---|
| (1) | 16 | 5 | 2 |
| (2) | 5 | 16 | 2 |
| (3) | 2 | 16 | 5 |
| (4) | 2 | 5 | 16 |

**34.** Which one of the following conditions will favour maximum formation of the product in the reaction,

$A_2(g) + B_2(g) \rightleftharpoons X_2(g)$ $\Delta_r H = -X$ kJ ?

(1) Low temperature and high pressure

(2) High temperature and low pressure

(3) High temperature and high pressure

(4) Low temperature and low pressure

**35.** When initial concentration of the reactant is doubled, the half-life period of a zero order reaction

(1) is halved

(2) remains unchanged

(3) is tripled

(4) is doubled

**36.** The bond dissociation energies of $X_2$, $Y_2$ and XY are in the ratio of 1 : 0·5 : 1. $\Delta H$ for the formation of XY is $-200$ kJ $mol^{-1}$. The bond dissociation energy of $X_2$ will be

(1) 200 kJ $mol^{-1}$

(2) 400 kJ $mol^{-1}$

(3) 800 kJ $mol^{-1}$

(4) 100 kJ $mol^{-1}$

**37.** The correction factor 'a' to the ideal gas equation corresponds to

(1) density of the gas molecules

(2) forces of attraction between the gas molecules

(3) electric field present between the gas molecules

(4) volume of the gas molecules

**38.** In which case is the number of molecules of water maximum ?

(1) 18 mL of water

(2) $10^{-3}$ mol of water

(3) 0·00224 L of water vapours at 1 atm and 273 K

(4) 0·18 g of water

**39.** The correct difference between first- and second-order reactions is that

(1) the rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations

(2) the rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations

(3) a first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed

(4) the half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$

**40.** Among $CaH_2$, $BeH_2$, $BaH_2$, the order of ionic character is

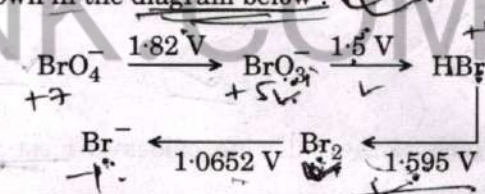
(1) $BeH_2 < CaH_2 < BaH_2$

(2) $BaH_2 < BeH_2 < CaH_2$

(3) $BeH_2 < BaH_2 < CaH_2$

(4) $CaH_2 < BeH_2 < BaH_2$

**41.** Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below :




Then the species undergoing disproportionation is

(1) $BrO_3^-$

(2) HBrO

(3) $Br_2$

(4) $BrO_4^-$



SPACE FOR ROUGH WORK

42. Consider the following species :

$CN^+$, $CN^-$, NO and CN

Which one of these will have the highest bond order ?

(1) NO

(2) CN

(3) $CN^+$

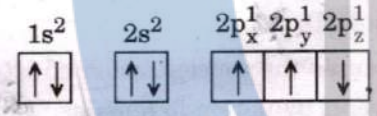
(4) $CN^-$

43. Which one is a ***wrong*** statement ?

(1) Total orbital angular momentum of electron in 's' orbital is equal to zero.

(2) The value of m for $d_{z^2}$ is zero.

(3) The electronic configuration of N atom is




(4) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

44. Iron exhibits bcc structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900°C (assuming molar mass and atomic radii of iron remains constant with temperature) is

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

(2) $\frac{1}{2}$

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

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

45. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is

(1) $Mg_2X_3$

(2) $Mg_3X_2$

(3) $Mg_2X$

(4) $MgX_2$

46. Which of the following gastric cells indirectly help in erythropoiesis ?

(1) Chief cells

(2) Parietal cells

(3) Goblet cells

(4) Mucous cells

47. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| *Column I* | | *Column II* | |
|---|---|---|---|
| a. | Fibrinogen | i. | Osmotic balance |
| b. | Globulin | ii. | Blood clotting |
| c. | Albumin | iii. | Defence mechanism |

| | a | b | c |
|---|---|---|---|
| (1) | iii | ii | i |
| (2) | ii | iii | i |
| (3) | i | iii | ii |
| (4) | i | ii | iii |

48. Calcium is important in skeletal muscle contraction because it

(1) binds to troponin to remove the masking of active sites on actin for myosin.

(2) prevents the formation of bonds between the myosin cross bridges and the actin filament.

(3) detaches the myosin head from the actin filament.

(4) activates the myosin ATPase by binding to it.

49. Which of the following is an occupational respiratory disorder ?

(1) Anthracis

(2) Emphysema

(3) Botulism

(4) Silicosis

UPI Rational
UPIQBANK.COM

50. Which of the following is an amino acid derived hormone ?

(1) Epinephrine

(2) Estriol

(3) Estradiol

(4) Ecdysone

51. Which of the following structures or regions is ***incorrectly*** paired with its function ?

(1) Medulla oblongata : controls respiration and cardiovascular reflexes.

(2) Corpus callosum : band of fibers connecting left and right cerebral hemispheres.

(3) Hypothalamus : production of releasing hormones and regulation of temperature, hunger and thirst.

(4) Limbic system : consists of fibre tracts that interconnect different regions of brain; controls movement.

52. The transparent lens in the human eye is held in its place by

(1) ligaments attached to the ciliary body

(2) smooth muscles attached to the ciliary body

(3) smooth muscles attached to the iris

(4) ligaments attached to the iris

53. Which of the following hormones can play a significant role in osteoporosis ?

(1) Aldosterone and Prolactin

(2) Parathyroid hormone and Prolactin

(3) Estrogen and Parathyroid hormone

(4) Progesterone and Aldosterone

54. Hormones secreted by the placenta to maintain pregnancy are

(1) hCG, hPL, progestogens, prolactin

(2) hCG, progestogens, estrogens, glucocorticoids

(3) hCG, hPL, progestogens, estrogens

(4) hCG, hPL, estrogens, relaxin, oxytocin

55. The contraceptive 'SAHELI'

(1) blocks estrogen receptors in the uterus, preventing eggs from getting implanted.

(2) is a post-coital contraceptive.

(3) is an IUD.

(4) increases the concentration of estrogen and prevents ovulation in females.

56. The amnion of mammalian embryo is derived from

(1) ectoderm and mesoderm

(2) ectoderm and endoderm

(3) mesoderm and trophoblast

(4) endoderm and mesoderm

57. The difference between spermiogenesis and spermiation is

(1) In spermiogenesis spermatids are formed, while in spermiation spermatozoa are formed.

(2) In spermiogenesis spermatozoa are formed, while in spermiation spermatozoa are released from sertoli cells into the cavity of seminiferous tubules.

(3) In spermiogenesis spermatozoa from sertoli cells are released into the cavity of seminiferous tubules, while in spermiation spermatozoa are formed.

(4) In spermiogenesis spermatozoa are formed, while in spermiation spermatids are formed.

Unique Pub International
UPI
UPIQPBANK.COM

58. All of the following are part of an operon *except*
(1) an operator
(2) a promoter
(3) an enhancer
(4) structural genes

59. A woman has an X-linked condition on one of her X chromosomes. This chromosome can be inherited by
(1) Only daughters
(2) Both sons and daughters
(3) Only grandchildren
(4) Only sons

60. According to Hugo de Vries, the mechanism of evolution is
(1) Multiple step mutations
(2) Minor mutations
(3) Phenotypic variations
(4) Saltation

61. AGGTATCGCAT is a sequence from the coding strand of a gene. What will be the corresponding sequence of the transcribed mRNA ?
(1) AGGUAUCGCAU
(2) UCCAUAGCGUA
(3) ACCUAUGCGAU
(4) UGGTUTCGCAT

62. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| *Column I* | *Column II* |
|---|---|
| a. Proliferative Phase | i. Breakdown of endometrial lining |
| b. Secretory Phase | ii. Follicular Phase |
| c. Menstruation | iii. Luteal Phase |

| | a | b | c |
|---|---|---|---|
| (1) | iii | ii | i |
| (2) | iii | i | ii |
| (3) | ii | iii | i |
| (4) | i | iii | ii |

63. In which disease does mosquito transmitted pathogen cause chronic inflammation of lymphatic vessels ?
(1) Elephantiasis
(2) Amoebiasis
(3) Ringworm disease
(4) Ascariasis

64. Conversion of milk to curd improves its nutritional value by increasing the amount of
(1) Vitamin D
(2) Vitamin E
(3) Vitamin $B_{12}$
(4) Vitamin A

65. Which of the following is ***not*** an autoimmune disease ?
(1) Psoriasis
(2) Vitiligo
(3) Alzheimer's disease
(4) Rheumatoid arthritis

66. Among the following sets of examples for divergent evolution, select the ***incorrect*** option :
(1) Forelimbs of man, bat and cheetah
(2) Eye of octopus, bat and man
(3) Brain of bat, man and cheetah
(4) Heart of bat, man and cheetah

67. The similarity of bone structure in the forelimbs of many vertebrates is an example of
(1) Homology
(2) Adaptive radiation
(3) Convergent evolution
(4) Analogy

68. Which of the following characteristics represent 'Inheritance of blood groups' in humans ?
a. Dominance
b. Co-dominance
c. Multiple allele
d. Incomplete dominance
e. Polygenic inheritance
(1) b, c and e
(2) a, c and e
(3) b, d and e
(4) a, b and c

Unique Group of Institutions
UPI
UPIOPBANK.COM



SPACE FOR ROUGH WORK

69. Which of the following options correctly represents the lung conditions in asthma and emphysema, respectively ?

(1) Inflammation of bronchioles; Decreased respiratory surface

(2) Decreased respiratory surface; Inflammation of bronchioles

(3) Increased respiratory surface; Inflammation of bronchioles

(4) Increased number of bronchioles; Increased respiratory surface

70. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| | *Column I* | | *Column II* |
|---|---|---|---|
| a. | Tricuspid valve | i. | Between left atrium and left ventricle |
| b. | Bicuspid valve | ii. | Between right ventricle and pulmonary artery |
| c. | Semilunar valve | iii. | Between right atrium and right ventricle |

| | **a** | **b** | **c** |
|---|---|---|---|
| (1) | iii | i | ii |
| (2) | ii | i | iii |
| (3) | i | ii | iii |
| (4) | i | iii | ii |

71. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| | *Column I* | | *Column II* |
|---|---|---|---|
| a. | Tidal volume | i. | 2500 – 3000 mL |
| b. | Inspiratory Reserve volume | ii. | 1100 – 1200 mL |
| c. | Expiratory Reserve volume | iii. | 500 – 550 mL |
| d. | Residual volume | iv. | 1000 – 1100 mL |

| | **a** | **b** | **c** | **d** |
|---|---|---|---|---|
| (1) | iii | ii | i | iv |
| (2) | iv | iii | ii | i |
| (3) | i | iv | ii | iii |
| (4) | iii | i | iv | ii |

72. Which one of the following population interactions is widely used in medical science for the production of antibiotics ?

(1) Commensalism

(2) Amensalism

(3) Parasitism

(4) Mutualism

73. All of the following are included in 'Ex-situ conservation' *except*

(1) Wildlife safari parks

(2) Seed banks

(3) Botanical gardens

(4) Sacred groves

74. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| | *Column I* | *Column II* |
|---|---|---|
| a. | Eutrophication | i. UV-B radiation |
| b. | Sanitary landfill | ii. Deforestation |
| c. | Snow blindness | iii. Nutrient enrichment |
| d. | Jhum cultivation | iv. Waste disposal |

| | **a** | **b** | **c** | **d** |
|---|---|---|---|---|
| (1) | ii | i | iii | iv |
| (2) | i | ii | iv | iii |
| (3) | iii | iv | i | ii |
| (4) | i | iii | iv | ii |

75. In a growing population of a country,

(1) pre-reproductive individuals are more than the reproductive individuals.

(2) pre-reproductive individuals are less than the reproductive individuals.

(3) reproductive and pre-reproductive individuals are equal in number.

(4) reproductive individuals are less than the post-reproductive individuals.

76. Which part of poppy plant is used to obtain the drug "Smack" ?

(1) Flowers

(2) Leaves

(3) Roots

(4) Latex



SPACE FOR ROUGH WORK



UPIQPBANK.COM

77. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| | *Column I* | | *Column II* |
|---|---|---|---|
| a. | Glycosuria | i. | Accumulation of uric acid in joints |
| b. | Gout | ii. | Mass of crystallised salts within the kidney |
| c. | Renal calculi | iii. | Inflammation in glomeruli |
| d. | Glomerular nephritis | iv. | Presence of glucose in urine |

| | a | b | c | d |
|---|---|---|---|---|
| (1) | iii | ii | iv | i |
| (2) | iv | i | ii | iii |
| (3) | ii | iii | i | iv |
| (4) | i | ii | iii | iv |

78. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| | *Column I (Function)* | | *Column II (Part of Excretory System)* |
|---|---|---|---|
| a. | Ultrafiltration | i. | Henle's loop |
| b. | Concentration of urine | ii. | Ureter |
| c. | Transport of urine | iii. | Urinary bladder |
| d. | Storage of urine | iv. | Malpighian corpuscle |
| | | v. | Proximal convoluted tubule |

| | a | b | c | d |
|---|---|---|---|---|
| (1) | iv | v | ii | iii |
| (2) | v | iv | i | iii |
| (3) | v | iv | i | ii |
| (4) | iv | i | ii | iii |

79. Nissl bodies are mainly composed of
(1) Proteins and lipids
(2) Free ribosomes and RER
(3) Nucleic acids and SER
(4) DNA and RNA

80. Which of these statements is ***incorrect*** ?
(1) Enzymes of TCA cycle are present in mitochondrial matrix.
(2) Oxidative phosphorylation takes place in outer mitochondrial membrane.
(3) Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms.
(4) Glycolysis occurs in cytosol.

81. Which of the following terms describe human dentition ?
(1) Thecodont, Diphyodont, Homodont
(2) Pleurodont, Diphyodont, Heterodont
(3) Pleurodont, Monophyodont, Homodont
(4) Thecodont, Diphyodont, Heterodont

82. Select the ***incorrect*** match :
(1) Lampbrush chromosomes – Diplotene bivalents
(2) Polytene chromosomes – Oocytes of amphibians
(3) Submetacentric chromosomes – L-shaped chromosomes
(4) Allosomes – Sex chromosomes

83. Which of the following events does ***not*** occur in rough endoplasmic reticulum ?
(1) Protein folding
(2) Phospholipid synthesis
(3) Cleavage of signal peptide
(4) Protein glycosylation

84. Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as
(1) Polysome
(2) Nucleosome
(3) Plastidome
(4) Polyhedral bodies

UPIQPBANK.COM



SPACE FOR ROUGH WORK

85. Which of the following animals does ***not*** undergo metamorphosis ?
(1) Earthworm
(2) Starfish
(3) Moth
(4) Tunicate

86. Which one of these animals is ***not*** a homeotherm ?
(1) *Macropus*
(2) *Psittacula*
(3) *Camelus*
(4) *Chelone*

87. Which of the following features is used to identify a male cockroach from a female cockroach ?
(1) Presence of a boat shaped sternum on the 9th abdominal segment.
(2) Presence of anal cerci
(3) Forewings with darker tegmina
(4) Presence of caudal styles

88. Identify the vertebrate group of animals characterized by crop and gizzard in its digestive system.
(1) Amphibia
(2) Osteichthyes
(3) Aves
(4) Reptilia

89. Ciliates differ from all other protozoans in
(1) using flagella for locomotion
(2) having two types of nuclei
(3) using pseudopodia for capturing prey
(4) having a contractile vacuole for removing excess water

90. Which of the following organisms are known as chief producers in the oceans ?
(1) Dinoflagellates
(2) Euglenoids
(3) Cyanobacteria
(4) Diatoms

91. The Golgi complex participates in
(1) Fatty acid breakdown
(2) Activation of amino acid
(3) Respiration in bacteria
(4) Formation of secretory vesicles

92. Stomata in grass leaf are
(1) Dumb-bell shaped
(2) Barrel shaped
(3) Rectangular
(4) Kidney shaped

93. The stage during which separation of the paired homologous chromosomes begins is
(1) Pachytene
(2) Zygotene
(3) Diakinesis
(4) Diplotene

94. The two functional groups characteristic of sugars are
(1) hydroxyl and methyl
(2) carbonyl and hydroxyl
(3) carbonyl and phosphate
(4) carbonyl and methyl

95. Which among the following is ***not*** a prokaryote ?
(1) *Saccharomyces*
(2) *Oscillatoria*
(3) *Nostoc*
(4) *Mycobacterium*

96. Stomatal movement is ***not*** affected by
(1) Temperature
(2) $CO_2$ concentration
(3) $O_2$ concentration
(4) Light

97. Which of the following is true for nucleolus ?
(1) Larger nucleoli are present in dividing cells.
(2) It is a site for active ribosomal RNA synthesis.
(3) It takes part in spindle formation.
(4) It is a membrane-bound structure.

98. Which of the following is ***not*** a product of light reaction of photosynthesis ?
(1) ATP
(2) Oxygen
(3) NADPH
(4) NADH

UPPBANK.COM



SPACE FOR ROUGH WORK

99. Which of the following elements is responsible for maintaining turgor in cells ?
(1) Magnesium
(2) Calcium
(3) Potassium
(4) Sodium

100. Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other ?
(1) *Hydrilla*
(2) *Viola*
(3) Banana
(4) *Yucca*

101. Pollen grains can be stored for several years in liquid nitrogen having a temperature of
(1) – 120°C
(2) – 160°C
(3) – 196°C
(4) – 80°C

102. Oxygen is ***not*** produced during photosynthesis by
(1) Green sulphur bacteria.
(2) *Chara*
(3) *Cycas*
(4) *Nostoc*

103. Double fertilization is
(1) Fusion of two male gametes of a pollen tube with two different eggs
(2) Syngamy and triple fusion
(3) Fusion of two male gametes with one egg
(4) Fusion of one male gamete with two polar nuclei

104. What is the role of $NAD^+$ in cellular respiration ?
(1) It functions as an enzyme.
(2) It is the final electron acceptor for anaerobic respiration.
(3) It is a nucleotide source for ATP synthesis.
(4) It functions as an electron carrier.

105. In which of the following forms is iron absorbed by plants ?
(1) Ferric
(2) Both ferric and ferrous
(3) Free element
(4) Ferrous

106. Select the ***correct*** statement :
(1) Franklin Stahl coined the term "linkage".
(2) Transduction was discovered by S. Altman.
(3) Spliceosomes take part in translation.
(4) Punnett square was developed by a British scientist.

107. Select the ***correct*** match :
(1) Alec Jeffreys – *Streptococcus pneumoniae*
(2) Francois Jacob and Jacques Monod – *Lac* operon
(3) Matthew Meselson and F. Stahl. – *Pisum sativum*
(4) Alfred Hershey and Martha Chase – TMV

108. The experimental proof for semiconservative replication of DNA was first shown in a
(1) Fungus
(2) Virus
(3) Plant
(4) Bacterium

109. Offsets are produced by
(1) Meiotic divisions
(2) Parthenogenesis
(3) Parthenocarpy
(4) Mitotic divisions

110. Which of the following pairs is ***wrongly*** matched ?
(1) Starch synthesis in pea : Multiple alleles
(2) T.H. Morgan : Linkage
(3) XO type sex determination : Grasshopper
(4) ABO blood grouping : Co-dominance

111. Which of the following has proved helpful in preserving pollen as fossils ?
(1) Pollenkitt
(2) Sporopollenin
(3) Oil content
(4) Cellulosic intine

112. Which of the following flowers only once in its life-time ?
(1) Bamboo species
(2) Papaya
(3) Mango
(4) Jackfruit

UPIQPBANK.COM



SPACE FOR ROUGH WORK

113. The correct order of steps in Polymerase Chain Reaction (PCR) is
(1) Extension, Denaturation, Annealing
(2) Denaturation, Annealing, Extension
(3) Denaturation, Extension, Annealing
(4) Annealing, Extension, Denaturation

114. In India, the organisation responsible for assessing the safety of introducing genetically modified organisms for public use is
(1) Indian Council of Medical Research (ICMR)
(2) Genetic Engineering Appraisal Committee (GEAC)
(3) Research Committee on Genetic Manipulation (RCGM)
(4) Council for Scientific and Industrial Research (CSIR)

115. Use of bioresources by multinational companies and organisations without authorisation from the concerned country and its people is called
(1) Bio-infringement
(2) Bioexploitation
(3) Biodegradation
(4) Biopiracy

116. Which of the following is commonly used as a vector for introducing a DNA fragment in human lymphocytes ?
(1) Retrovirus
(2) pBR 322
(3) λ phage
(4) Ti plasmid

117. A 'new' variety of rice was patented by a foreign company, though such varieties have been present in India for a long time. This is related to
(1) Co-667
(2) Basmati
(3) Lerma Rojo
(4) Sharbati Sonora

118. Select the ***correct*** match :
(1) Ribozyme – Nucleic acid
(2) G. Mendel – Transformation
(3) T.H. Morgan – Transduction
(4) $F_2$ × Recessive parent – Dihybrid cross

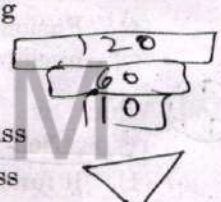
119. Natality refers to
(1) Death rate
(2) Number of individuals entering a habitat
(3) Number of individuals leaving the habitat
(4) Birth rate

120. World Ozone Day is celebrated on
(1) 5th June
(2) 22nd April
(3) 16th September
(4) 21st April

121. Which of the following is a secondary pollutant ?
(1) CO
(2) $O_3$
(3) $SO_2$
(4) $CO_2$

122. Niche is
(1) all the biological factors in the organism's environment
(2) the functional role played by the organism where it lives
(3) the range of temperature that the organism needs to live
(4) the physical space where an organism lives

123. What type of ecological pyramid would be obtained with the following data ?
Secondary consumer : 120 g
Primary consumer : 60 g
Primary producer : 10 g
(1) Inverted pyramid of biomass
(2) Upright pyramid of biomass
(3) Upright pyramid of numbers
(4) Pyramid of energy




124. In stratosphere, which of the following elements acts as a catalyst in degradation of ozone and release of molecular oxygen ?
(1) Carbon
(2) Oxygen
(3) Fe
(4) Cl

UPI International
UPIOPBANK.COM



SPACE FOR ROUGH WORK

125. Casparian strips occur in
(1) Epidermis
(2) Endodermis
(3) Cortex
(4) Pericycle

126. Plants having little or no secondary growth are
(1) Grasses
(2) Cycads
(3) Conifers
(4) Deciduous angiosperms

127. Which of the following statements is ***correct*** ?
(1) Ovules are not enclosed by ovary wall in gymnosperms.
(2) Stems are usually unbranched in both *Cycas* and *Cedrus*.
(3) Horsetails are gymnosperms.
(4) *Selaginella* is heterosporous, while *Salvinia* is homosporous.

128. Select the ***wrong*** statement :
(1) Cell wall is present in members of Fungi and Plantae.
(2) Mitochondria are the powerhouse of the cell in all kingdoms except Monera.
(3) Pseudopodia are locomotory and feeding structures in Sporozoans.
(4) Mushrooms belong to Basidiomycetes.

129. Secondary xylem and phloem in dicot stem are produced by
(1) Apical meristems
(2) Axillary meristems
(3) Phellogen
(4) Vascular cambium

130. Pneumatophores occur in
(1) Halophytes
(2) Submerged hydrophytes
(3) Carnivorous plants
(4) Free-floating hydrophytes

131. Sweet potato is a modified
(1) Stem
(2) Rhizome
(3) Tap root
(4) Adventitious root

132. Which one is ***wrongly*** matched ?
(1) Uniflagellate gametes – *Polysiphonia*
(2) Unicellular organism – *Chlorella*
(3) Gemma cups – *Marchantia*
(4) Biflagellate zoospores – Brown algae

133. After karyogamy followed by meiosis, spores are produced exogenously in
(1) *Neurospora*
(2) *Saccharomyces*
(3) *Agaricus*
(4) *Alternaria*

134. Match the items given in Column I with those in Column II and select the ***correct*** option given below :

| | *Column I* | | *Column II* |
|---|---|---|---|
| a. | Herbarium | i. | It is a place having a collection of preserved plants and animals. |
| b. | Key | ii. | A list that enumerates methodically all the species found in an area with brief description aiding identification. |
| c. | Museum | iii. | Is a place where dried and pressed plant specimens mounted on sheets are kept. |
| d. | Catalogue | iv. | A booklet containing a list of characters and their alternates which are helpful in identification of various taxa. |

| | a | b | c | d |
|---|---|---|---|---|
| (1) | i | iv | iii | ii |
| (2) | iii | iv | i | ii |
| (3) | ii | iv | iii | i |
| (4) | iii | ii | i | iv |

135. Winged pollen grains are present in
(1) Mustard
(2) *Pinus*
(3) Mango
(4) *Cycas*

UPIQPBANK.COM

136. An inductor 20 mH, a capacitor 100 μF and a resistor 50 Ω are connected in series across a source of emf, V = 10 sin 314 t. The power loss in the circuit is

(1) 0·79 W
(2) 1·13 W
(3) 2·74 W
(4) 0·43 W

137. A metallic rod of mass per unit length 0·5 kg $m^{-1}$ is lying horizontally on a smooth inclined plane which makes an angle of 30° with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction 0·25 T is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is

(1) 7·14 A
(2) 11·32 A
(3) 14·76 A
(4) 5·98 A

138. Current sensitivity of a moving coil galvanometer is 5 div/mA and its voltage sensitivity (angular deflection per unit voltage applied) is 20 div/V. The resistance of the galvanometer is

(1) 40 Ω
(2) 500 Ω
(3) 250 Ω
(4) 25 Ω

139. A thin diamagnetic rod is placed vertically between the poles of an electromagnet. When the current in the electromagnet is switched on, then the diamagnetic rod is pushed up, out of the horizontal magnetic field. Hence the rod gains gravitational potential energy. The work required to do this comes from

(1) the current source
(2) the induced electric field due to the changing magnetic field
(3) the lattice structure of the material of the rod
(4) the magnetic field

140. Unpolarised light is incident from air on a plane surface of a material of refractive index 'μ'. At a particular angle of incidence 'i', it is found that the reflected and refracted rays are perpendicular to each other. Which of the following options is correct for this situation ?

(1) Reflected light is polarised with its electric vector parallel to the plane of incidence
(2) $i = \tan^{-1}\left(\frac{1}{\mu}\right)$
(3) $i = \sin^{-1}\left(\frac{1}{\mu}\right)$
(4) Reflected light is polarised with its electric vector perpendicular to the plane of incidence

141. In Young's double slit experiment the separation d between the slits is 2 mm, the wavelength λ of the light used is 5896 Å and distance D between the screen and slits is 100 cm. It is found that the angular width of the fringes is 0·20°. To increase the fringe angular width to 0·21° (with same λ and D) the separation between the slits needs to be changed to

(1) 1·8 mm
(2) 1·7 mm
(3) 2·1 mm
(4) 1·9 mm

142. An astronomical refracting telescope will have large angular magnification and high angular resolution, when it has an objective lens of

(1) small focal length and large diameter
(2) small focal length and small diameter
(3) large focal length and large diameter
(4) large focal length and small diameter


SPACE FOR ROUGH WORK

143. An object is placed at a distance of 40 cm from a concave mirror of focal length 15 cm. If the object is displaced through a distance of 20 cm towards the mirror, the displacement of the image will be

(1) 30 cm away from the mirror

(2) 36 cm towards the mirror

(3) 30 cm towards the mirror

(4) 36 cm away from the mirror

144. An em wave is propagating in a medium with a velocity $\vec{V} = V\hat{i}$. The instantaneous oscillating electric field of this em wave is along +y axis. Then the direction of oscillating magnetic field of the em wave will be along

(1) – z direction

(2) – x direction

(3) – y direction

(4) + z direction

145. The magnetic potential energy stored in a certain inductor is 25 mJ, when the current in the inductor is 60 mA. This inductor is of inductance

(1) 0·138 H

(2) 13·89 H

(3) 1·389 H

(4) 138·88 H

146. The refractive index of the material of a prism is $\sqrt{2}$ and the angle of the prism is 30°. One of the two refracting surfaces of the prism is made a mirror inwards, by silver coating. A beam of monochromatic light entering the prism from the other face will retrace its path (after reflection from the silvered surface) if its angle of incidence on the prism is

(1) 60°

(2) zero

(3) 30°

(4) 45°

147. A moving block having mass m, collides with another stationary block having mass 4m. The lighter block comes to rest after collision. When the initial velocity of the lighter block is v, then the value of coefficient of restitution (e) will be

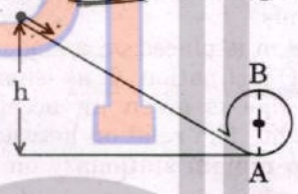
(1) 0·5

(2) 0·4

(3) 0·8

(4) 0·25

148. A body initially at rest and sliding along a frictionless track from a height h (as shown in the figure) just completes a vertical circle of diameter AB = D. The height h is equal to




(1) $\frac{3}{2}$D

(2) $\frac{5}{4}$D

(3) $\frac{7}{5}$D

(4) D

149. Three objects, A : (a solid sphere), B : (a thin circular disk) and C : (a circular ring), each have the same mass M and radius R. They all spin with the same angular speed ω about their own symmetry axes. The amounts of work (W) required to bring them to rest, would satisfy the relation

(1) $W_C > W_B > W_A$

(2) $W_A > W_C > W_B$

(3) $W_B > W_A > W_C$

(4) $W_A > W_B > W_C$

150. Which one of the following statements is ***incorrect*** ?

(1) Rolling friction is smaller than sliding friction.

(2) Coefficient of sliding friction has dimensions of length.

(3) Frictional force opposes the relative motion.

(4) Limiting value of static friction is directly proportional to normal reaction.



SPACE FOR ROUGH WORK

**151.** A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\vec{E}$. Due to the force $q\vec{E}$, its velocity increases from 0 to 6 m/s in one second duration. At that instant the direction of the field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively

(1) 2 m/s, 4 m/s
(2) 1·5 m/s, 3 m/s
(3) 1 m/s, 3·5 m/s
(4) 1 m/s, 3 m/s

**152.** A block of mass m is placed on a smooth inclined wedge ABC of inclination θ as shown in the figure. The wedge is given an acceleration 'a' towards the right. The relation between a and θ for the block to remain stationary on the wedge is

(1) $a = \frac{g}{\text{cosec}\,\theta}$
(2) $a = g\tan\theta$
(3) $a = g\cos\theta$
(4) $a = \frac{g}{\sin\theta}$

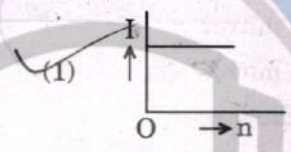
**153.** The moment of the force, $\vec{F} = 4\hat{i} + 5\hat{j} - 6\hat{k}$ at (2, 0, – 3), about the point (2, – 2, – 2), is given by

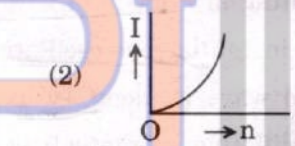
(1) $-8\hat{i} - 4\hat{j} - 7\hat{k}$
(2) $-7\hat{i} - 4\hat{j} - 8\hat{k}$
(3) $-7\hat{i} - 8\hat{j} - 4\hat{k}$
(4) $-4\hat{i} - \hat{j} - 8\hat{k}$

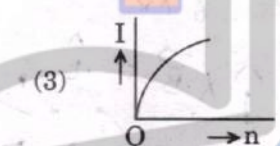
**154.** A student measured the diameter of a small steel ball using a screw gauge of least count 0·001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of – 0·004 cm, the correct diameter of the ball is

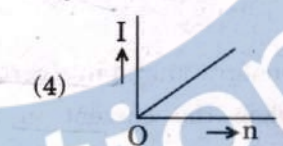
(1) 0·521 cm
(2) 0·529 cm
(3) 0·053 cm
(4) 0·525 cm

**155.** A battery consists of a variable number 'n' of identical cells (having internal resistance 'r' each) which are connected in series. The terminals of the battery are short-circuited and the current I is measured. Which of the graphs shows the correct relationship between I and n ?

(1)



(2)



(3)



(4)



**156.** A carbon resistor of (47 ± 4·7) kΩ is to be marked with rings of different colours for its identification. The colour code sequence will be

(1) Violet – Yellow – Orange – Silver
(2) Green – Orange – Violet – Gold
(3) Yellow – Green – Violet – Gold
(4) Yellow – Violet – Orange – Silver

**157.** A set of 'n' equal resistors, of value 'R' each, are connected in series to a battery of emf 'E' and internal resistance 'R'. The current drawn is I. Now, the 'n' resistors are connected in parallel to the same battery. Then the current drawn from battery becomes 10 I. The value of 'n' is

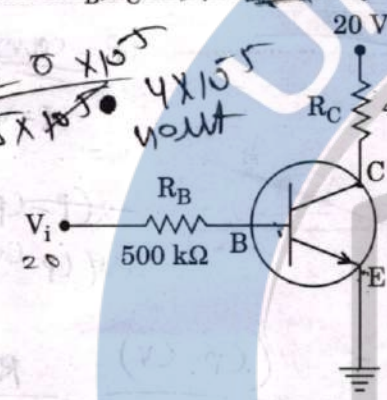
(1) 10
(2) 9
(3) 20
(4) 11

UPI International
UPIQBANK.COM



SPACE FOR ROUGH WORK

**158.** In the circuit shown in the figure, the input voltage $V_i$ is 20 V, $V_{BE}$ = 0 and $V_{CE}$ = 0. The values of $I_B$, $I_C$ and $\beta$ are given by



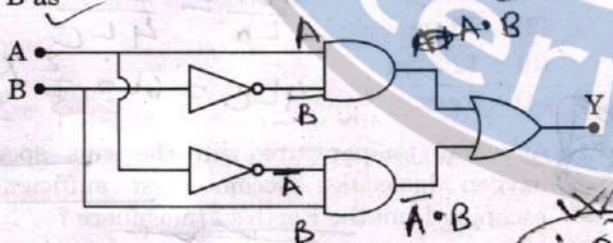

(1) $I_B = 40\ \mu A,\ I_C = 10\ mA,\ \beta = 250$

(2) $I_B = 40\ \mu A,\ I_C = 5\ mA,\ \beta = 125$

(3) $I_B = 20\ \mu A,\ I_C = 5\ mA,\ \beta = 250$

(4) $I_B = 25\ \mu A,\ I_C = 5\ mA,\ \beta = 200$

**159.** In the combination of the following gates the output Y can be written in terms of inputs A and B as




(1) $\overline{A.B}$

(2) $\overline{A+B}$

(3) $\overline{A.B} + A.B$

(4) $A.\overline{B} + \overline{A}.B$

**160.** In a p-n junction diode, change in temperature due to heating

(1) affects only reverse resistance

(2) affects the overall V – I characteristics of p-n junction

(3) does not affect resistance of p-n junction

(4) affects only forward resistance

**161.** An electron of mass m with an initial velocity $\vec{V} = V_0 \hat{i}$ $(V_0 > 0)$ enters an electric field $\vec{E} = -E_0 \hat{i}$ $(E_0 = \text{constant} > 0)$ at t = 0. If $\lambda_0$ is its de-Broglie wavelength initially, then its de-Broglie wavelength at time t is

(1) $\dfrac{\lambda_0}{\left(1+\dfrac{eE_0}{mV_0}t\right)}$

(2) $\lambda_0$

(3) $\lambda_0 t$

(4) $\lambda_0\left(1+\dfrac{eE_0}{mV_0}t\right)$

**162.** The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is

(1) 1 : 1

(2) 1 : – 2

(3) 2 : – 1

(4) 1 : – 1

**163.** For a radioactive material, half-life is 10 minutes. If initially there are 600 number of nuclei, the time taken (in minutes) for the disintegration of 450 nuclei is

(1) 20

(2) 15

(3) 30

(4) 10

**164.** When the light of frequency $2\nu_0$ (where $\nu_0$ is threshold frequency), is incident on a metal plate, the maximum velocity of electrons emitted is $v_1$. When the frequency of the incident radiation is increased to $5\nu_0$, the maximum velocity of electrons emitted from the same plate is $v_2$. The ratio of $v_1$ to $v_2$ is

(1) 1 : 2

(2) 2 : 1

(3) 4 : 1

(4) 1 : 4



SPACE FOR ROUGH WORK

**165.** A tuning fork is used to produce resonance in a glass tube. The length of the air column in this tube can be adjusted by a variable piston. At room temperature of 27°C two successive resonances are produced at 20 cm and 73 cm of column length. If the frequency of the tuning fork is 320 Hz, the velocity of sound in air at 27°C is

(1) 330 m/s

(2) 300 m/s

(3) 350 m/s

(4) 339 m/s

**166.** The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A, is

(1) independent of the distance between the plates.

(2) inversely proportional to the distance between the plates.

(3) proportional to the square root of the distance between the plates.

(4) linearly proportional to the distance between the plates.

**167.** An electron falls from rest through a vertical distance h in a uniform and vertically upward directed electric field E. The direction of electric field is now reversed, keeping its magnitude the same. A proton is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall of the proton is

(1) smaller

(2) equal

(3) 10 times greater

(4) 5 times greater

**168.** A pendulum is hung from the roof of a sufficiently high building and is moving freely to and fro like a simple harmonic oscillator. The acceleration of the bob of the pendulum is 20 $m/s^2$ at a distance of 5 m from the mean position. The time period of oscillation is

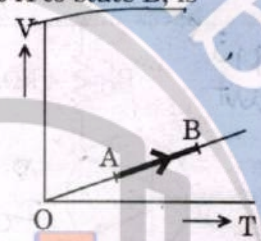
(1) $2\pi$ s

(2) 1 s

(3) 2 s

(4) $\pi$ s

**169.** The volume (V) of a monatomic gas varies with its temperature (T), as shown in the graph. The ratio of work done by the gas, to the heat absorbed by it, when it undergoes a change from state A to state B, is




(1) $\frac{2}{5}$

(2) $\frac{2}{7}$

(3) $\frac{1}{3}$

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

**170.** The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is

(1) 13·2 cm

(2) 16 cm

(3) 12·5 cm

(4) 8 cm

**171.** At what temperature will the rms speed of oxygen molecules become just sufficient for escaping from the Earth's atmosphere ?

(Given :

Mass of oxygen molecule (m) = $2{\cdot}76 \times 10^{-26}$ kg

Boltzmann's constant $k_B = 1{\cdot}38 \times 10^{-23}$ J $K^{-1}$)

(1) $2{\cdot}508 \times 10^4$ K

(2) $1{\cdot}254 \times 10^4$ K

(3) $5{\cdot}016 \times 10^4$ K

(4) $8{\cdot}360 \times 10^4$ K

**172.** The efficiency of an ideal heat engine working between the freezing point and boiling point of water, is

(1) 26·8%

(2) 12·5%

(3) 6·25%

(4) 20%



SPACE FOR ROUGH WORK

173. The power radiated by a black body is P and it radiates maximum energy at wavelength, $\lambda_0$. If the temperature of the black body is now changed so that it radiates maximum energy at wavelength $\frac{3}{4}\lambda_0$, the power radiated by it becomes nP. The value of n is

(1) $\frac{3}{4}$

(2) $\frac{81}{256}$

(3) $\frac{256}{81}$

(4) $\frac{4}{3}$

174. Two wires are made of the same material and have the same volume. The first wire has cross-sectional area A and the second wire has cross-sectional area 3A. If the length of the first wire is increased by $\Delta l$ on applying a force F, how much force is needed to stretch the second wire by the same amount ?

(1) 9 F

(2) F

(3) 4 F

(4) 6 F

175. A small sphere of radius 'r' falls from rest in a viscous liquid. As a result, heat is produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity, is proportional to

(1) $r^3$

(2) $r^4$

(3) $r^5$

(4) $r^2$

176. A sample of 0·1 g of water at 100°C and normal pressure ($1{\cdot}013 \times 10^5$ $Nm^{-2}$) requires 54 cal of heat energy to convert to steam at 100°C. If the volume of the steam produced is 167·1 cc, the change in internal energy of the sample, is

(1) 104·3 J

(2) 84·5 J

(3) 42·2 J

(4) 208·7 J

177. A solid sphere is rotating freely about its symmetry axis in free space. The radius of the sphere is increased keeping its mass same. Which of the following physical quantities would remain constant for the sphere ?

(1) Angular velocity

(2) Angular momentum

(3) Rotational kinetic energy

(4) Moment of inertia

178. A solid sphere is in rolling motion. In rolling motion a body possesses translational kinetic energy ($K_t$) as well as rotational kinetic energy ($K_r$) simultaneously. The ratio $K_t : (K_t + K_r)$ for the sphere is

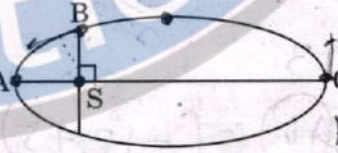
(1) 7 : 10

(2) 2 : 5

(3) 10 : 7

(4) 5 : 7

179. The kinetic energies of a planet in an elliptical orbit about the Sun, at positions A, B and C are $K_A$, $K_B$ and $K_C$, respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as shown in the figure. Then




(1) $K_A < K_B < K_C$

(2) $K_B > K_A > K_C$

(3) $K_B < K_A < K_C$

(4) $K_A > K_B > K_C$

180. If the mass of the Sun were ten times smaller and the universal gravitational constant were ten times larger in magnitude, which of the following is ***not*** correct ?

(1) Raindrops will fall faster.

(2) 'g' on the Earth will not change.

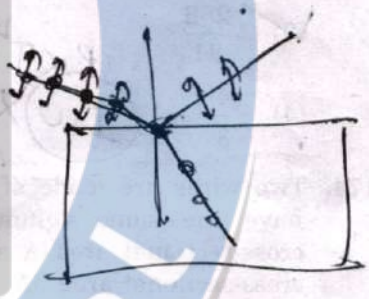
(3) Time period of a simple pendulum on the Earth would decrease.

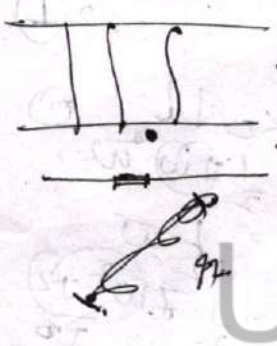
(4) Walking on the ground would become more difficult.

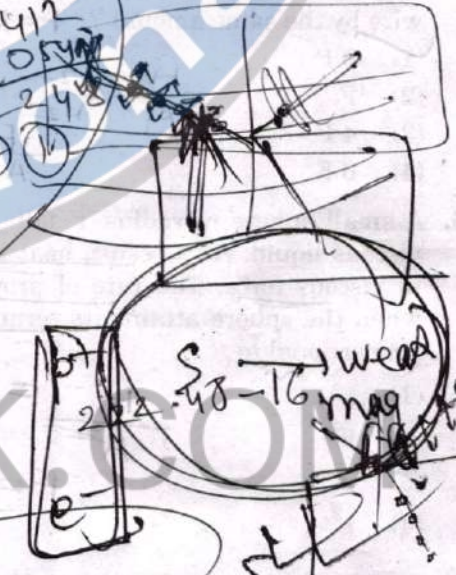
UPI International
UPIQPBANK.COM

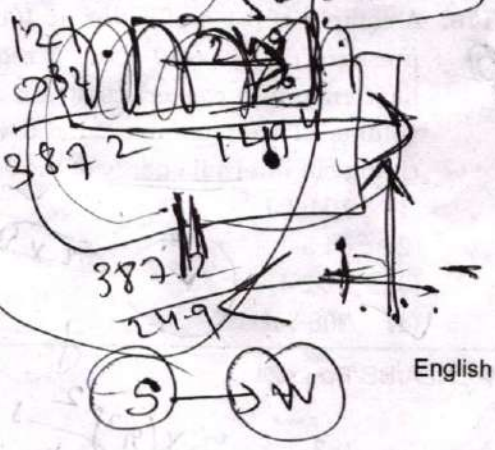


SPACE FOR ROUGH WORK

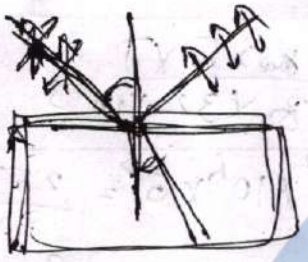




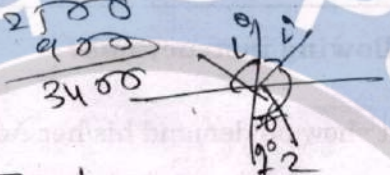


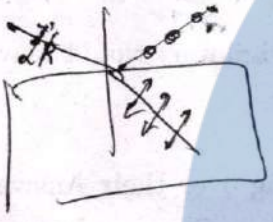


Unique Publication International
UPI
UPIQPBANK.COM



SPACE FOR ROUGH WORK

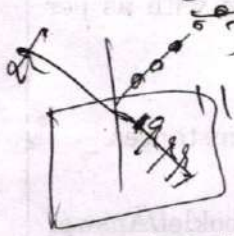




$2(MnO_4^- + 5e^- + 8H^+ \rightarrow Mn^+ + 4H_2O$

$5)C_2O_4^{-2} \rightarrow 2CO_2 + 2e^-$

$2MnO_4^- + 16H^+ + 5C_2O_4^{-2} \rightarrow 2Mn^{+2} + 10CO_2$



$11.2 \times 10^3 = \sqrt{\frac{3 \times 8.314 \times T}{32 \times 10^{-3}}}$

$(11.2)^2 \times 10^6 = \frac{3 \times 8.314}{3.2 \times 10^{-2}} \times T$

$-200 = \left[\frac{1}{2}(x) + \frac{1}{2}(0.5x)\right] - [x]$

$Q = U + W$

$(54 \times 4.12) - (1.67 \times 10^{-4})$

$200 = x - 0.75x$

$x = 800$

$1.671 \times 10^{-4}$

$167 \times 10^{-6}$

$1.67 \times 10^{-4} \times 10^5$

$1.67 \times 1$

UPIQPBANK.COM



English

**Read carefully the following instructions :**

1. Each candidate must show on demand his/her Admit Card to the Invigilator.
2. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
3. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. **Cases where a candidate has not signed the Attendance Sheet second time will be deemed not to have handed over the Answer Sheet and dealt with as an unfair means case.**
4. Use of Electronic/Manual Calculator is prohibited.
5. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
6. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
7. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

Unique Publication International
UPI
UPIQRBANK.COM