

IMPORTANT INSTRUCTIONS :

❖ **Pattern of the Entrance Examination:-**

Paper containing 180 objective type questions, from Biology, Physics and Chemistry

❖ **Use Blue/Black Ball Point Pen only** to darken the appropriate circle. Answers marked with pencil would not be evaluated.

❖ Each item carries **4marks**. For each correct response the candidate will get 4 marks. For each incorrect response **1mark** will be deducted from the total score

01. The chief or primary photosynthetic pigment of cyanobacteria is
- (1) Phycocyanin
 - (2) Phycoerythrin
 - (3) Chlorophyll- 'a'
 - (4) Carotenoid
02. Which of the following is true in relation to museum?
- (1) It deals with living objects
 - (2) It is mainly connected with ex-situ conservation
 - (3) Larger animals are never preserved in museums
 - (4) It deals with preserved objects and materials of both plants & animals for study and reference
03. Choose incorrect statement from the following.
- (1) Cerebral aqueduct passes through cerebrum.
 - (2) Human kidneys excrete 25 – 30 gms of urea per day
 - (3) Calcium ions are essential for blood clotting and muscle contraction
 - (4) Deficiency of iodine in diet can cause goitre
04. Excretory organs in crustaceans
- (1) Gills
 - (2) Green glands
 - (3) Proboscis gland
 - (4) Malpighian tubules
05. Identify the correct statement in relation to acellular slime moulds
- (1) Parasitic naked multinucleated plasmodium, spores without walls dispersed by air currents
 - (2) Saprophytic naked multinucleated plasmodium, spores with walls dispersed by water currents.
 - (3) Saprophytic thin walled multinucleated plasmodium and spores without walls dispersed by water currents
 - (4) Saprophytic wall less naked multinucleated plasmodium and spores with walls dispersed by air currents

06. Sometimes doctors inject a hormone to induce delivery after full term pregnancy. Which hormone is injected? How does it induce delivery?

- (1) Mifepristone to induce abortion by stimulating uterine contractions
- (2) Relaxin to induce labour pains
- (3) Cortisols to suppress foetal rejection
- (4) Oxytocin to stimulate uterine contractions.

07. Match the column A with column B

Column - A	Column - B
I. <i>Sargassum</i>	A. Bryophyte
II. <i>Salvia</i>	B. Pteridophyte
III. <i>Salvinia</i>	C. Alga
IV. <i>Sphagnum</i>	D. Angiosperm
	E. Gymnosperm

- | | | | |
|-------|----|-----|----|
| I | II | III | IV |
| (1) C | B | D | A |
| (2) C | D | B | A |
| (3) C | D | A | B |
| (4) B | D | B | A |

08. Choose the correct set of physiological barriers of innate immunity in the human digestive tract.

- (1) HCl in stomach, lysozyme in tears
- (2) Peyer's patches, saliva
- (3) Kupffer cells of liver, mucus
- (4) HCl in stomach, lysozyme in intestine

09. Stamens are attached to perianth/tepals in the flowers of

- (1) Pea
- (2) Lily
- (3) Brinjal
- (4) China rose

10. Which of the following interspecific interaction involves coevolution and acts as a natural check for one species population?

- (1) Abingdon tortoise and goats
- (2) Sea anemone and clown fish
- (3) *Plasmodium* - human
- (4) Fig - wasp

11. Carpels are obliquely placed in

- (1) Ashwagandha
- (2) *Asparagus*
- (3) Muliathi
- (4) Mustard

12. The first meiotic division during gametogenesis of human produces

- (1) Spermatid
- (2) Second polar body
- (3) Secondary spermatocyte
- (4) Primary oocyte

13. Protoxylem lies towards the medulla in primary xylem of

- (1) Dicot root only
- (2) Monocot root only
- (3) Dicot stem
- (4) Both 1 & 2

14. The ex situ conservation methods of biodiversity for animals

- (1) Safari park and sperm banks
- (2) Sacred grove and zoological park
- (3) Botanical garden and seed banks
- (4) Tissue culture method and pollen banks

15. Bark is a non technical term that refers to all tissues

- (1) Formed by redifferentiation process only
- (2) Interior to vascular cambium
- (3) Exterior to vascular cambium
- (4) Formed by dedifferentiation process only

16. Volume of air that remains in the lungs after normal expiration is

- (1) Expiratory reserve volume
- (2) Functional residual capacity
- (3) Expiratory capacity
- (4) Residual volume

17. Which complex tissue element is absent in most of the monocotyledons ?

- (1) Collenchyma
- (2) Xylem parenchyma
- (3) Phloem parenchyma
- (4) Sieve tube elements

18. DNA and RNA digesting enzymes are mainly found in

- (1) Nucleus
- (2) Mitochondria
- (3) Lysosomes
- (4) Nucleolus

19. Which of the following is a nucleoside ?

- (1) Uridine
- (2) Guanine
- (3) Thymine
- (4) Cytosine

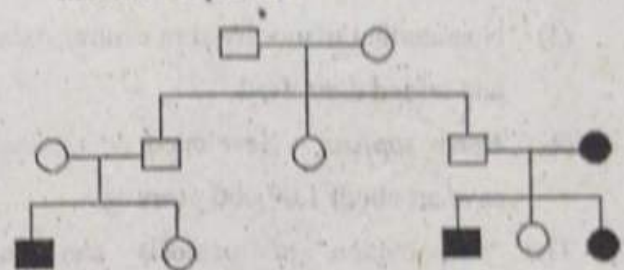
20. A person with peptic (stomach) ulcers is likely to suffer with

- (a) Indigestion
 - (b) Anaemia
 - (c) Glucosuria
 - (d) Stones in gall bladder
 - (e) Vomiting
- (1) a, b, e
 - (2) b, c, d
 - (3) c, d, e
 - (4) a, c, d

21. Choose the correct matching of the given items with their corresponding group.

	Items	Group
(1)	Malleus, incus, scapula	Ear ossicles
(2)	Medulla, pons, cerebellum	Brain stem
(3)	Frontal, ethmoid, sphenoid	Cranial bones
(4)	Fovea, macula, optic disc	Retina of eye

22. Identify the genetic trait from the given pedigree analysis by observing the inheritance pattern.



- (1) Haemophilia
- (2) Sickle - cell anaemia
- (3) Myotonic dystrophy
- (4) Incontinentia pigmenti

23. Which is not true for NAD ?

- (1) It serves as a cofactor
- (2) It has two nucleotides
- (3) It contains vitamin b_1
- (4) It can act as coenzyme of malate dehydrogenase

24. Radula is found in

- (1) *Aplysia*
- (2) *Ascidia*
- (3) *Antedon*
- (4) *Adamsia*

25. Choose mismatch from the following
- (1) Diakinesis – Final stage of meiosis – I
 - (2) Metaphase – I – Bivalents align on the equatorial plate
 - (3) Telophase – Nucleolus, Golgi complex and ER are reformed
 - (4) Anaphase – II – Splitting of the centromere of each chromosome
26. Choose correct combination with reference to human evolution
- (1) *Australopithecines* – hunted with stone weapons about 1.5 mya
 - (2) *Homo erectus* – first hominid with brain capacity of 650 cc and ate meat
 - (3) Neanderthal man – lived in central Asia and buried their dead
 - (4) *Homo sapiens* – developed prehistoric cave art about 1,00,000 years ago
27. The phenomenon of osmosis can be demonstrated by
- (1) Bell jar experiment
 - (2) Hydrilla funnel experiment
 - (3) Thistle funnel experiment
 - (4) Moll's half leaf experiment
28. Which sexually transmitted infection affecting the genital organs is not completely curable?
- (1) Genital warts
 - (2) HIV
 - (3) Gonorrhoea
 - (4) Genital herpes
29. Main force responsible for guttation is
- (1) Transpiration pull
 - (2) Negative hydrostatic pressure
 - (3) Root pressure
 - (4) Hydathodes
30. Identify the micronutrient that delays flowering if its concentration in plants is low
- (1) Nitrogen
 - (2) Sulphur
 - (3) Molybdenum
 - (4) All
31. Choose correct pair
- (1) *Balanus* and *Balaenoptera* – Competition
 - (2) Sea anemone and clown fish – Commensalism
 - (3) *Entamoeba* and human – Ectoparasitism
 - (4) *Cuscuta* and hedge plant – Amensalism
32. A woman is using oral pills for 21 days as a method of contraception. Which of the following reproductive changes is seen in her during the usage of pills?
- (1) High levels of progesterone by corpus luteum inhibits ovulation
 - (2) Menstruation due to degeneration of corpus luteum
 - (3) Increased secretion of FSH due to increased levels of estrogen
 - (4) Absence of ovulation due to inhibition of gonadotropins secretion by progestogens
33. Select mismatch from the following
- (1) RuBisCO – Largest enzyme molecule found in mesophyll cells of C_4 plants
 - (2) RuBP – 5-carbon ketose sugar
 - (3) OAA – First formed product of C_4 pathway
 - (4) PEP – Primary acceptor of CO_2 present in mesophyll cells of C_4 plants

34. Complex IV of ETS of inner mitochondrial membrane refers to

- (1) Cytochrome 'c' oxidase complex
- (2) Cytochrome 'c' reductase complex
- (3) Cytochrome 'bc₁' complex
- (4) Cytochrome 'c'

35. Which of the following is not a vector borne disease?

- (1) Dengue
- (2) Filariasis
- (3) Delhi boils
- (4) Diphtheria

36. Placental mammals in Australia are adapted to live in diverse habitats. This explains

- (1) Adaptive radiation
- (2) Convergent evolution
- (3) Homoplasy
- (4) Stabilising selection

37. Which phytohormone promotes root growth and root hairs formation in an intact plant?

- (1) Auxins
- (2) Ethylene
- (3) Cytokinins
- (4) Gibberellins

38. Read the following and choose correct option.

Statement A: Biodiversity hot spots deserve strict protection for many threatened species.
Statement B: Species endemism and richness is high in Western Ghats.

- (1) Both statement A and statement B are incorrect
- (2) Both statement A and statement B are correct

(3) Statement A is correct but statement B is incorrect

(4) Statement A is incorrect but statement B is correct

39. Select incorrect match from the following

- (1) Phylloclade – Modified leaf
- (2) Thorn – Modified stem
- (3) Spine – Modified leaf
- (4) Pneumatophores – Modified roots

40. The picture given below represents the regulation of hypothalamus on pituitary. Choose the answer with correct option for A, B, C, D and E.



(1) A – Hypothalamic neuron, C – Oxytocin

(2) B – ACTH, D – ADH

(3) B – Somatostatin, E – Anterior pituitary

(4) B – Gn RH, D – LH

41. Coiling of garden pea tendrils around the support due to touch is an example of

- (1) Thigmotaxis
- (2) Thigmonasty
- (3) Thermotaxis
- (4) Thigmotropism

42. Read the following.

	Animal	Two characters	Class/Phylum
A	<i>Ichthyophis</i>	Two pairs of limbs, 3-chambered heart	Amphibia
B	<i>Echinus</i>	Water vascular system, external fertilisation	Echinodermata
C	<i>Exocoetus</i>	Placoid scales, operculum on gills	Osteichthyes
D	<i>Meandrina</i>	Cnidoblasts, skeleton composed of calcium carbonate	Cnidaria

Choose the option with correct set.

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

43. Reproductive leaves are found in

- (1) *Dahlia*
- (2) Potato
- (3) *Bryophyllum*
- (4) Water hyacinth

44. Match the contents in column I with column II and choose the correct option.

Column I	Column II
A) Parkinson's disease	I) UV-B radiation
B) Snow blindness	II) Degeneration of thymus
C) Immunodeficiency	III) Low level of estrogen
D) Diabetes mellitus	IV) Hyperglycemia
E) Osteoporosis	V) Loss of dopamine

- (1) A - V, B - I, C - IV, D - II, E - III
 - (2) A - V, B - I, C - II, D - IV, E - III
 - (3) A - V, B - II, C - I, D - IV, E - III
 - (4) A - V, B - I, C - III, D - IV, E - II
45. Both asexual spores and gametes are non-motile in members of
- (1) Cyanobacteria
 - (2) Rhodophyceae
 - (3) Phaeophyceae
 - (4) Chlorophyceae
46. Male and female gametophytes do not have an independent free-living existence in
- (1) *Cycas*
 - (2) *Pteris*
 - (3) *Marchantia*
 - (4) *Dryopteris*
47. The intine of pollen grain is
- (1) Mainly made up of sporopollenin
 - (2) Thin and continuous layer made up of cellulose and pectin
 - (3) Thick and discontinuous layer made up of cellulose and pectin
 - (4) Thin and continuous layer made up of cellulose and suberin

48. Match the contents in column - I with column - II and identify the correct option.

Column - I	Column - II
A) Phenylketonuria	I) Palm crease
B) Down's syndrome	II) Mutant haemoglobin
C) Klinefelter's syndrome	III) Mental retardation
D) Sickle cell anaemia	IV) Gynaecomastia
E) Haemophilia	V) Deletion of ADA gene
	VI) Blood clotting disorder

- (1) A - I, B - III, C - IV, D - II, E - VI
 (2) A - III, B - I, C - IV, D - II, E - VI
 (3) A - III, B - I, C - V, D - IV, E - II
 (4) A - III, B - II, C - IV, D - I, E - VI
49. Which of the following factors favour dissociation of oxygen from oxyhaemoglobin?
- (a) High Ph
 (b) High pCO_2
 (c) High temperature
 (d) High pO_2
- (1) a, b, c
 (2) b, c, d
 (3) a, b only
 (4) b, c only
50. Choose the incorrect pair
- (1) CFC - global warming
 (2) Montreal protocol - 1997
 (3) Jhum cultivation - deforestation
 (4) Sanitary landfills - Underground water pollution

51. The residual persistent nucellus present in the seed is known as
- (1) Perisperm
 (2) Endosperm
 (3) Aril
 (4) Placenta
52. A couple is with 'A' and 'AB' blood group. Which child determines the heterozygosity of 'A' blood group of the parent?
- (1) B
 (2) AB
 (3) A
 (4) AB or A or O
53. Which of the following is not related to B DNA molecule?
- (1) Two polynucleotide chains are complimentary to each other
 (2) Two polynucleotide chains have antiparallel polarity
 (3) Two polynucleotide chains are coiled in a right-handed fashion
 (4) The back bone of polynucleotide chains are formed by sugar & nitrogen bases with glycosidic bonds.
54. Autoimmune disorder causing paralysis of muscle
- (1) Tetany
 (2) Muscular dystrophy
 (3) Myasthenia gravis
 (4) Sarcoma
55. Histones are rich in basic amino acid residues like
- (1) Lysines and Arginines
 (2) Leucines and Arginines
 (3) Lysines and Alanines
 (4) Leucines and Alanines

56. Increase in ventricular pressure of heart causes
- (1) Closure of A-V valves
 - (2) Closure of semilunar valves
 - (3) Opening of A-V valves
 - (4) Ventricular filling
57. Which of the following biomolecule was the first genetic material ?
- (1) Ribose nucleic acid
 - (2) Deoxyribose nucleic acid
 - (3) Protein
 - (4) Lipid
58. Statement I : A transcriptional unit is a portion of DNA molecule in which structural genes flank the promoter and terminator genes on either sides and codes for a mRNA molecule.
Statement II : A translational unit in mRNA is the sequence of RNA that is flanked by the start codon and the stop codon and codes for a polypeptide chain
- (1) Both SI & SII are correct
 - (2) Both SI & SII are wrong
 - (3) Only SI is correct
 - (4) Only SII is correct
59. Which of the following is an introduced rice variety in India ?
- (1) Jaya
 - (2) Ratna
 - (3) Taichung Native - I
 - (4) All
60. "Fimbriae" are associated with
- (1) Infundibulum of oviduct
 - (2) White matter of spinal cord
 - (3) Glans penis
 - (4) Isthmus of fallopian tube
61. Hag fish, dog fish and devil fish are similar in possessing the following features
- (1) Marine animals with pharyngeal gills for respiration
 - (2) Bilateral symmetry and true coelom
 - (3) Internal fertilisation and indirect development
 - (4) Metamerism and closed circulation
62. The various trophic levels of a food chain are given below.
Big tree → Insects → Insectivorous birds → Larger birds.
Which of the following ecological pyramid explains the relationship between all trophic levels?
- (1) Inverted pyramid of numbers
 - (2) Inverted pyramid of biomass
 - (3) Spindle shaped pyramid of biomass
 - (4) Upright pyramid of biomass
63. Statins are produced by
- (1) *Streptomyces rimosus*
 - (2) *Monascus purpureus*
 - (3) *Trichoderma polysporum*
 - (4) *Aspergillus niger*
64. The epithelium lining the GI tract cavity is
- (1) Simple columnar
 - (2) Simple squamous
 - (3) Ciliated columnar
 - (4) Cuboidal with brush border
65. The technology of biogas production was developed in India mainly due to the efforts of
- (1) NBRI and KVIC
 - (2) KVIC and IRRI
 - (3) IARI and KVIC
 - (4) The Ministry of Environment and Forests

66. Choose incorrect statement about the features of neoplastic cells

- (1) They exhibit metastasis
- (2) Avoid detection by NK cells
- (3) Loss of contact inhibition
- (4) Regulation of cell growth and differentiation

67. The protein encoded by the gene *cryI* Ab controls

- (1) Corn borer
- (2) Cotton bollworms
- (3) *Bacillus thuringiensis*
- (4) Leaf curl virus

68. The mycelium is aseptate and coenocytic in

- (1) Coconut
- (2) *Rhizopus*
- (3) *Agaricus*
- (4) *Neurospora*

69. The joint between carpals is

- (1) Condyloid joint
- (2) Gliding joint
- (3) Saddle joint
- (4) Hinge joint

70. Which breeding technique helps us to evolve pure lines in dairy farms?

- (1) Cross breeding
- (2) Out crossing
- (3) Inbreeding
- (4) Interspecific hybridisation

71. Potato spindle tuber disease is caused by

- (1) Virus
- (2) Viroid
- (3) Prion
- (4) Fungus

72. Match the column A with column B

Column - A	Column - B
A. Precipitation of DNA	I. Lysozyme
B. Multiple copies of DNA	II. Chilled Ethanol
C. Bacterial cell wall digestion	III. Gel electrophoresis
D. Separation of DNA fragments	IV. PCR
	V. Ethidium bromide

A B C D

- (1) II IV I III
- (2) V IV I III
- (3) IV I II V
- (4) II I IV V

73. Statement A: Spleen is grave yard of RBC.

Statement B: Lymph borne antigens are filtered by spleen to activate immunocompetent lymphocytes.

- (1) Both statement A and statement B are correct
- (2) Both statement A and statement B are incorrect
- (3) Statement A is correct but statement B is incorrect
- (4) Statement A is incorrect but statement B is correct

74. Disaccharidases are secreted by

- (1) Pancreas
- (2) Salivary glands
- (3) Crypts of Lieberkhun
- (4) Gastric glands

75. Which of the following bio-geochemical cycle has a major reservoir in sedimentary rocks ?

- (1) Nitrogen cycle
- (2) Phosphorus cycle
- (3) Carbon cycle
- (4) More than one option is correct

76. Read the following

- (i) Blubber below the skin
- (ii) Larger ears and limbs
- (iii) Thermoregulation
- (iv) Aestivation

Which of the above adaptations help in survival of mammals in polar region?

- (1) i, ii, iii
- (2) i, iii
- (3) ii, iii, iv
- (4) ii, iii

77. A) Inheritance of flower colour in dog flower plant shows codominance
B) Linkage helps to produce high degree of recombinations
C) In *Drosophila* the male flies are bigger and female flies are small
D) Green pods in pea plant is a recessive character

How many of the above mention statements are false ?

- (1) 4
- (2) 3
- (3) 2
- (4) 1

78. Photochemical smog pollution does not contain

- (1) Peroxyacetyl nitrate
- (2) Ozone
- (3) Nitrogen dioxide

(4) Sulphur dioxide

79. Statement I : In pea seeds the starch grains with Bb genotype are of intermediate size
Statement II : The size of starch grains in pea seed is controlled by a pleiotropic gene

- (1) Both SI & SII are correct
- (2) Both SI & SII are wrong
- (3) Only SI is correct
- (4) Only SII is correct

80. Identify the first restriction endonuclease enzyme producing blunt ends

- (1) *EcoR I*
- (2) *Hind II*
- (3) *EcoR V*
- (4) *Hind III*

81. If the recessive genotype frequency is 0.25 in a Hardy - Weinberg population, the genotype frequency of heterozygous individuals will be

- (1) 0.5
- (2) 0.75
- (3) 0.37
- (4) 0.25

82. Choose incorrect statement about glucocorticoids

- (1) Produce inflammatory response
- (2) Stimulate erythropoiesis
- (3) Inhibit protein synthesis
- (4) Elevate blood glucose level

83. Which one of the following is regarded as a natural genetic engineer ?

- (1) *Neurospora*
- (2) *Drosophila*
- (3) *Agrobacterium*
- (4) *Klebsiella*

84. Non plastidial, non photosynthetic, water soluble pigment present in the vacuole is

- (1) Anthocyanin
- (2) Phycoerythrin
- (3) Chlorophyll
- (4) Carotenoid

85. Which of the following is responsible for formation of concentrated urine?

- (1) Low osmolarity of blood
- (2) Inhibition of aldosterone
- (3) Passive diffusion of urea into medullary interstitium
- (4) Increase in GFR

86. Select correct option with reference to cockroach

- (1) Malpighian tubules excrete uric acid into mid gut
- (2) Males bear phallomeres and caudal styles
- (3) Metathoracic wings are called tegmina
- (4) Dorsal nerve cord shows paired ganglia

87. Given below is the scientific name of Mango. Identify the correctly written name

- (1) Mangifera Indica
- (2) *Mangifera Indica*
- (3) mangifera indica
- (4) *Mangifera indica*

88. Hypoglycemic hormone

- (1) Glucagon
- (2) Insulin
- (3) Cortisol
- (4) Adrenalin

89. Identify the A and B from the given diagram in relation to sex organs of *Chara*.



A	B
(1) Archegonium	Antheridium
(2) Antheridium	Archegonium
(3) Antheridium	Oogonium
(4) Nucule	Globule

90. The specific receptors responsible for maintenance of body balance

- (1) Hair cells of organ of Corti
- (2) Otoliths and macula lutea
- (3) Cochlea and Crista
- (4) Crista ampullaris and macula

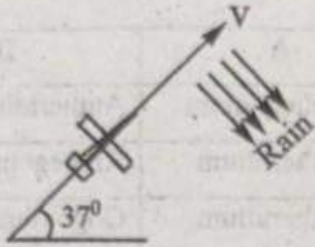
91. If 'R' is Rydberg's constant, C-velocity of light, h-Plank's constant, L-inductance, V-electric potential, r-electric resistance, i-current and c-capacitance then which of the following has same dimensions as that of RCh

- (1) $L\left(\frac{V}{r}\right)^2$
- (2) $L\left(\frac{di}{dt}\right)$
- (3) Lc
- (4) rc

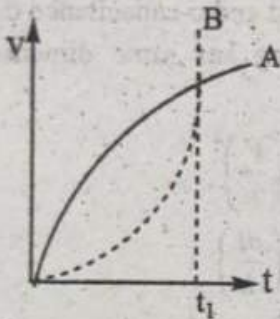
92. Person A moving with a constant velocity of 20m/s wishes to catch person B who starts from rest and moving with constant acceleration of 2ms^{-2} in same direction 100m ahead of him. Determine time taken by person A to catch B

- (1) 10 s
- (2) 20 s
- (3) 30 s
- (4) 40 s

93. Rain is falling with speed $12\sqrt{2}$ m/s at an angle of 45° with vertical line. A man in a glider going at a speed of 'v' at angle of 37° with horizontal with respect to ground. The speed (in m/s) of glider so that rain appears to him falling vertically is (motion of glider and rain drops are in same vertical plane)



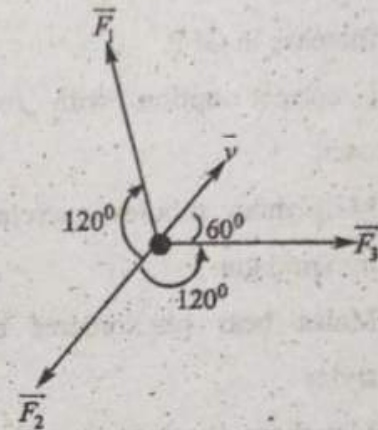
- (1) 15
 (2) 60
 (3) 20
 (4) 30
94. At $t = 0$, two trucks A and B were at same point on the road. They are moving along parallel lines. Motion of trucks A and B are represented by bold and dotted lines respectively. At time $t = t_1$



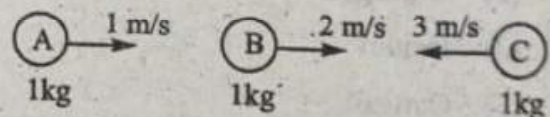
- (1) Truck B is ahead of truck A
 (2) Acceleration of trucks A and B are equal
 (3) Speed of truck A decreases and speed of truck B increases
 (4) Truck A is ahead of truck B
95. A projectile is thrown, from the origin along X-Y plane to have maximum possible horizontal range of 200 m. The position vector of the projectile when its speed is minimum is (take Y on the vertical axis)

- (1) $(100\hat{i} + 100\hat{j})m$
 (2) $(100\hat{i} + 200\hat{j})m$
 (3) $(100\hat{i} + 50\hat{j})m$
 (4) $(200\hat{i} + 100\hat{j})m$

96. A particle is moving in a plane with velocity 'v' as shown. If it is now acted upon by forces \vec{F}_1, \vec{F}_2 and \vec{F}_3 of magnitude 10N, 10N and 15N respectively in the same plane as shown then



- (1) its velocity changes only in magnitude
 (2) its velocity changes only in direction
 (3) its velocity changes in both magnitude and direction
 (4) its velocity remains constant.
97. Three bodies are moving as shown below. The total kinetic energy of the system of three masses in the frame of reference of 'B' is



- (1) 13 J
 (2) 25 J
 (3) 20.5 J
 (4) 8.5 J

98. A toy car can deliver a constant power of 20 W. The resistive force on the car is αv where 'v' is velocity of car in m/s. If maximum velocity of car is 2 m/s, then the value of α is

- (1) 10
- (2) 5
- (3) 15
- (4) 20

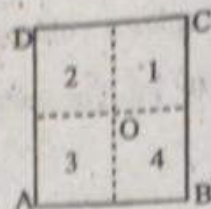
99. In a circular motion of a particle, the tangential acceleration of the particle is given by $a_t = 9m/s^2$. The radius of the circle is 4m. The particle was initially at rest. Time after which acceleration of the particle makes an angle of 45° with the radial acceleration is

- (1) $\frac{1}{3}s$
- (2) $\frac{2}{3}s$
- (3) 1s
- (4) $\frac{4}{3}s$

100. A ball of mass 'm' moving at speed 'u' makes a head on collision with an identical ball at rest. The kinetic energy of the balls after the collision is three-fourth of the original. The coefficient of restitution (e) is

- (1) 1
- (2) 0
- (3) $\frac{1}{2}$
- (4) $\frac{1}{\sqrt{2}}$

101. In the given figure four rods AB, BC, CD and DA of same length and of masses 'm', 2m, 3m and 4m respectively arranged in the form of a square. The region in which (numbered 1,2,3,4) the centre of mass of system lies in



- (1) region 1
- (2) region 2
- (3) region 3
- (4) region 4

102. A disc at rest at the top of the inclined plane of height 'h' rolls down without slipping and acquires a velocity 'v' on reaching the bottom. If the same disc slides down a smooth incline and acquires the same velocity on reaching the bottom then the height of smooth incline is

- (1) h/3
- (2) h/2
- (3) 2h/3
- (4) h

103. Let A and B be the points respectively above and below the earth's surface each at a distance equal to half the radius of the earth. If the acceleration due to gravity at these points be g_A and g_B respectively, the ratio $g_B : g_A$ is

- (1) 1:1
- (2) 9:8
- (3) 8:9
- (4) zero

104. Three moles of an ideal gas 'A' with $\frac{C_p}{C_v} = \frac{4}{3}$ is mixed with two moles of another ideal gas 'B' with $\frac{C_p}{C_v} = \frac{5}{3}$ at constant temperature.

The ratio $\frac{C_p}{C_v}$ of the mixture is

- (1) 1.5
- (2) 1.42
- (3) 1.7
- (4) 1.3

105. An ideal gas occupies a volume of 2m^3 at a pressure of 3×10^6 Pa. The energy of the gas is:

- (1) 3×10^2
- (2) 10^8 J
- (3) 6×10^4 J
- (4) 9×10^6 J

106. A block of mass 'm' and surface area A just begins to slide down an incline when the angle of inclination is 30° . Keeping the mass of the block same, if the surface area is doubled, without any change in surface finish then the inclination of the plane at which the block starts sliding will be

- (1) 60°
- (2) 30°
- (3) 15°
- (4) 45°

107. If a body is performing SHM, then its
A) average kinetic energy per cycle is equal to half of its maximum kinetic energy
B) mean speed over a complete cycle is equal to $\frac{2}{\pi}$ times of its maximum speed

- (1) Only A is correct
- (2) Only B is correct
- (3) Both A and B are correct
- (4) Both A and B are wrong

108. A solid sphere of radius 'R' is floating in a liquid with half its volume submerged. When the sphere is pressed down slightly and released, it executes small oscillations. The time period is

(1) $2\pi\sqrt{\frac{R}{g}}$

(2) $2\pi\sqrt{\frac{2R}{3g}}$

(3) $2\pi\sqrt{\frac{3R}{2g}}$

(4) $2\pi\sqrt{\frac{4R}{3g}}$

109. Two immiscible liquids of densities d and $2d$ are taken in a cylindrical vessel with equal heights each 'h'. An efflux of the liquid coming out of the orifice of area 'A' made to the wall of the vessel at its bottom. The force on the vessel is

- (1) $Adgh$
- (2) $6 Adgh$
- (3) $3Adgh$
- (4) $4 Adgh$

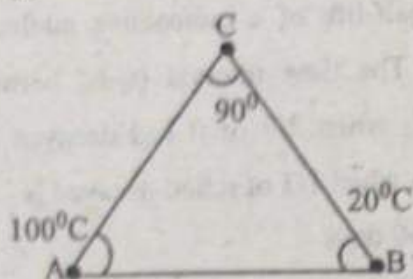
110. Bulk modulus of a material, whose Poisson's ratio equal to 0.5 is

- (1) Zero
- (2) infinity
- (3) of the order of 10^{11} Pa
- (4) of the order of 10^4 Pa

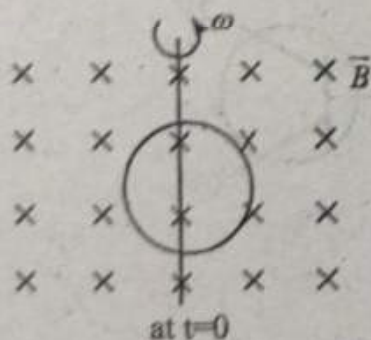
111. Oil rises up in the wick of diya (lamp) because

- (1) of high surface tension of oil
- (2) of capillaries formed in the wick
- (3) angle of contact between oil and wick is obtuse
- (4) cohesive forces between oil molecules predominates adhesive forces

112. Three rods of identical cross-section and of same material form the sides of right angled isosceles triangle as shown. If the points A and B are maintained at 100°C and 20°C , then the steady state temperature of point C, will be

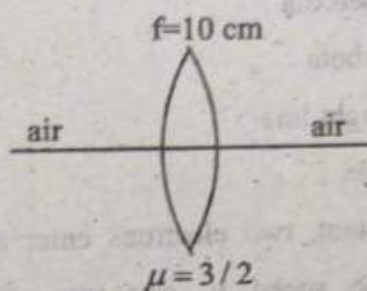


- (1) 60°C
 (2) 90°C
 (3) 30°C
 (4) 40°C
113. A given ray of light suffers minimum deviation in an equilateral prism P. If refractive index increases slightly, then the ray will now suffer
- (1) greater deviation
 (2) no deviation
 (3) same deviation as before
 (4) less deviation
114. A ring is rotated about a diametric axis in a uniform magnetic field perpendicular to the plane of the ring with a time period 10 s. If initially the plane of the ring is perpendicular to the magnetic field then the instant of time at which EMF will be maximum & minimum respectively for the first time is



- (1) 10 s, 5 s
 (2) 5 s, 7.5 s
 (3) 2.5 s, 7.5 s
 (4) 2.5 s, 5 s

115. Given set-up which is shown in figure, converges parallel beam of light at point P_1 . If the surrounding medium of the set-up is replaced by transparent fluid of refractive index 2 then the same parallel beam appears to come from point P_2 . The distance P_1P_2 is



- (1) 70 cm
 (2) 20 cm
 (3) 10 cm
 (4) 30 cm
116. Which of the following statements is wrong?
- (a) Yellow light is used in fog lamps for vehicles as it is scattered most by fog particles
 (b) Red light is used as danger signal as it is scattered least by atmospheric particles
 (c) In primary rainbow violet appears on the top and red at the bottom
- (1) only a
 (2) only b
 (3) both a and c
 (4) both b and c

117. In a single slit diffraction set up, second minima is observed at an angle 60° . The expected position of first minima is

- (1) 30°
- (2) 45°
- (3) $<30^\circ$
- (4) $>60^\circ$

118. A young's double slit experiment uses two monochromatic point sources. The shape of interference fringes formed on the screen parallel to plane of the slits is

- (1) Hyperbola
- (2) Parabola
- (3) Straight line
- (4) Circle

119. At an instant, two electrons enter normally with same speed v , one into region of uniform electric field and other into uniform magnetic field. After some time, if de Broglie wavelength of two electrons respectively are λ_1 and λ_2 then

- (1) $\lambda_1 = \lambda_2$
- (2) $\lambda_1 > \lambda_2$
- (3) $\lambda_1 < \lambda_2$
- (4) $\lambda_1 = 2\lambda_2$

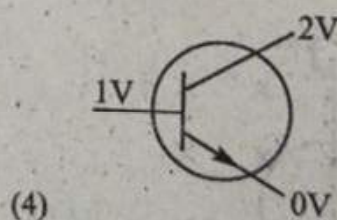
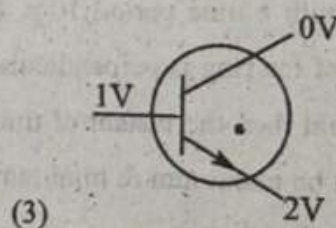
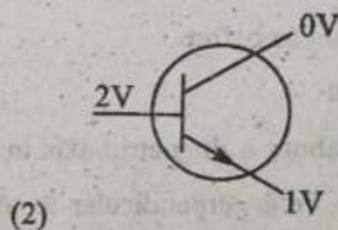
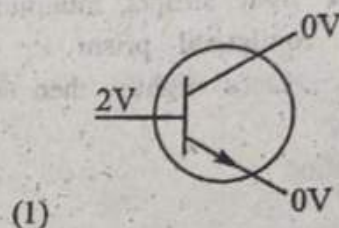
120. A particle of charge equal to that of an electron, $-e$ and mass 208 times the mass of electron (called μ -meson) moves in a circular orbit around a nucleus of charge $+3e$ (take the mass of the nucleus to be infinite). Assuming that Bohr model of the atom is applicable to this system, find the value of 'n' for which the radius of the orbit is approximately the same as that of the first Bohr orbit for the hydrogen atom

- (1) 25
- (2) 1
- (3) 5
- (4) 15

121. The half-life of a radioactive nucleus is 50 days. The time interval $(t_2 - t_1)$ between the time t_2 when $2/3$ of it has decayed and the time t_1 when $1/3$ of it had decayed is

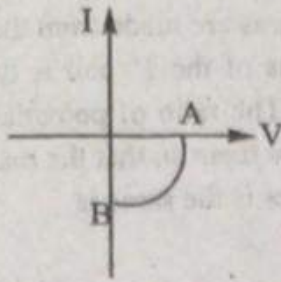
- (1) 60 days
- (2) 15 days
- (3) 30 days
- (4) 50 days

122. In which of the following cases, the transistor is operating in the active region?



123. The given graph represents V-I characteristic for a semiconductor device. Hyderabad

Which of the following statements is correct?



- (1) It is V-I characteristic for solar cell where, point A represents open circuit voltage and point B short circuit current
- (2) It is for a solar cell and point A and B represent open circuit voltage and current, respectively
- (3) It is for photodiode and point A and B represent open circuit voltage and current, respectively
- (4) It is for a LED and points A and B represent open circuit voltage and short circuit current, respectively

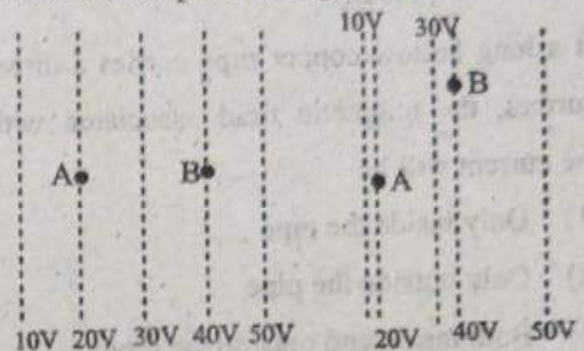
124. An LCR series circuit is compared with a damped oscillator of mass 'm' with force constant K and damping coefficient 'b'. The correct matching of quantities in damped oscillator analogous with those in LCR circuit is

- (1) $L \rightarrow m, C \rightarrow \frac{1}{k}, R \rightarrow b$
- (2) $L \rightarrow m, C \rightarrow k, R \rightarrow b$
- (3) $L \rightarrow k, C \rightarrow b, R \rightarrow m$
- (4) $L \rightarrow \frac{1}{m}, C \rightarrow \frac{1}{k}, R \rightarrow \frac{1}{b}$

125. Two infinite plane sheets have uniform surface charge density $+\sigma \text{ Cm}^{-2}$. If they are inclined at an angle 60° with each other then the magnitude of electric field strength at a point in between the plane sheets of charge is

- (1) $\frac{\sigma}{2\epsilon_0}$
- (2) $\frac{\sigma}{\epsilon_0}$
- (3) $\frac{2\sigma}{\epsilon_0}$
- (4) $\frac{3\sigma}{4\epsilon_0}$

126. Figure shows some equipotential lines distributed in space. A charged particle is moved from point A to point B



Field-I

Field-II

- (1) The work done in field I is greater
- (2) The work done in field I is smaller
- (3) The work done is the same in field I and field II
- (4) The work done is zero in field I and is positive in field II

127. In a potentiometer experiment, the galvanometer shows no deflection when a cell is connected across 60cm of the potentiometer wire. If the cell is shunted by a resistance of 6Ω , the balance is obtained across 50cm of the wire. The internal resistance of the cell is

- (1) 0.5Ω
- (2) 0.6Ω
- (3) 1.2Ω
- (4) 1.5Ω

128. A dip circle is placed in geographic meridian at a place where dip and declination are δ and D respectively. The dip measured by dip circle is

- (1) δ
- (2) $\tan^{-1}\left(\frac{\tan \delta}{\sin D}\right)$
- (3) $\tan^{-1}\left(\frac{\cos D}{\tan \delta}\right)$
- (4) $\tan^{-1}\left(\frac{\tan \delta}{\cos D}\right)$

129. If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be

- (1) Only inside the pipe
- (2) Only outside the pipe
- (3) Both inside and outside the pipe
- (4) Neither inside nor outside the pipe

130. An electron orbiting around a nucleus has angular momentum L . The magnetic field produced by the electron at the centre of the orbit can be expressed as (Terms have their usual meaning)

- (1) $\left(\frac{\mu_0 e}{8\pi m r^3}\right)L$
- (2) $\left(\frac{\mu_0 e}{4\pi m r^3}\right)L$
- (3) $\left(\frac{\mu_0 e}{\pi m r^3}\right)L$
- (4) $\left(\frac{e}{4\pi \epsilon_0 m r^3}\right)L$

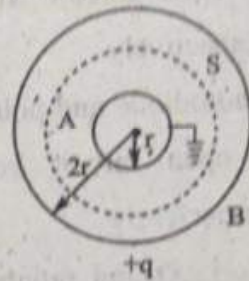
131. Ozone layer blocks

- (1) Infrared radiation
- (2) Microwaves
- (3) Ultraviolet radiation
- (4) Visible radiation

132. Two circular coils 1 and 2 having same number of turns are made from the same wire but the radius of the 1st coil is twice that of the 2nd coil. The ratio of potential difference applied across them so that the magnetic field at their centres is the same is

- (1) 3
- (2) 2
- (3) 6
- (4) 4

133. The conducting shells A and B are arranged as shown below. If charge on the shell B is 'q' then electric flux linked with the spherical Gaussian surface S is



- (1) $\frac{q}{\epsilon_0}$
- (2) $\frac{q}{2\epsilon_0}$
- (3) $\frac{q}{\epsilon_0}$
- (4) $\frac{q}{2\epsilon_0}$

134. Two wires made of same material having same length and of radii ' r ' and $2r$ ' respectively are welded together end to end. The combination is used as a sonometer wire and is kept under a tension T . When stationary waves are set up in the wires then joint is a node. The ratio of number of loops formed in the wires, is

- (1) 2:3
- (2) 1:1
- (3) 1:2
- (4) 1:4

135. The wavelength of the spectral line coming from a star is changed from 6000\AA to 6001\AA . The velocity of the star with respect to the earth is

- (1) $2.5 \times 10^4 \text{ ms}^{-1}$ approach
- (2) $2.5 \times 10^4 \text{ ms}^{-1}$ recession
- (3) $5 \times 10^4 \text{ ms}^{-1}$ approach
- (4) $5 \times 10^4 \text{ ms}^{-1}$ recession

136. Ziegler - Natta catalyst is an organometallic compound of which metal

- (1) Iron
- (2) Zirconium
- (3) Rhodium
- (4) Titanium

137. Which of the following will contains maximum energy

- (1) $2S(\text{H})$
- (2) $2S(\text{Li})$
- (3) $2S(\text{Na})$
- (4) $2S(\text{K})$

138. Which among the following is not a correct combination ?

- (1) Antacid : Cimetidine or Ranitidine
- (2) Analgesics : Aspirin or Morphine
- (3) Anti depressants: Iproniazid or Phenelzine
- (4) Disinfectants: 0.2% solution of phenol or Furacine

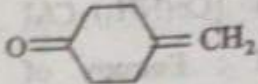
139. Which of the following orders is wrong ?

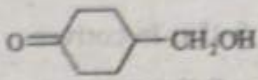
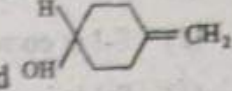
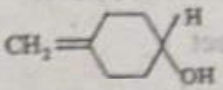
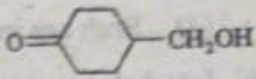
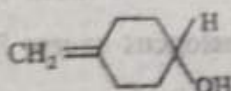
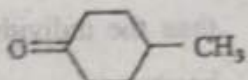
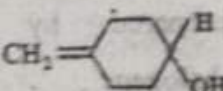
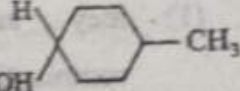
- (1) $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$...oxidizing power
- (2) $\text{Be} < \text{Li} < \text{C} < \text{B}$ - ionisation potential
- (3) $\text{Al}_2\text{O}_3 < \text{MgO} < \text{Na}_2\text{O} < \text{K}_2\text{O}$ - Basic
- (4) $\text{Ba}^{2+} > \text{Sr}^{2+} > \text{Ca}^{2+} > \text{Mg}^{2+}$ - ionic radius

140. During the preparation of H_2O_2 by electrolytic method the product formed at

The anode is

- (1) H_2
- (2) SO_2
- (3) $\text{H}_2\text{S}_2\text{O}_8$
- (4) O_2

141. The reaction of  with BH_3 / THF followed by $\text{H}_2\text{O}_2, \text{OH}^-$ gives product A and with NaBH_4 , gives the product B. 'A' and 'B' are respectively

- (1)  and 
- (2)  and 
- (3)  and 
- (4)  and 

142. Carbon monoxide is harmful to human beings as it.

- (1) Is carcinogenic
- (2) Is antagonistic to CO_2
- (3) Has higher affinity for haemoglobin as compared to oxygen
- (4) Is destructive to CO_2

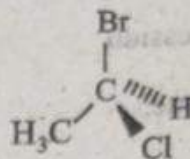
143. Which among the following set is incorrect ?

- (1) Increasing order of bond order : $\text{O}_2^{-2} < \text{O}_2 < \text{O}_2^{+1}$
- (2) Increasing order of bond angle : $\text{SnCl}_4 < \text{BCl}_3 < \text{BeCl}_2$
- (3) Increasing order of dipole moment : $\text{NH}_3 < \text{NF}_3$
- (4) Increasing order of C-C bond length : Ethyne < Ethene < Benzene < Ethane

144. In which of the following, the metal-ligand bond has both σ and π bond character
- (1) $[\text{Co}(\text{NH}_3)_6]^{3+}$
 - (2) $[\text{Ni}(\text{CO})_4]$
 - (3) $[\text{PtCl}_4]^{-2}$
 - (4) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
145. S-I : Entropy of a perfect crystalline substance at absolute zero is zero.
S-II : At absolute zero translational kinetic energy of a system is zero.
- (1) Both S-I & II are correct.
 - (2) S-I is correct, S-II is incorrect
 - (3) S-I is incorrect, S-II is correct
 - (4) Both are incorrect
146. Interhalogen compounds are more reactive than the individual halogens except fluorine because
- (1) they are prepared by direct combination of halogens
 - (2) $X-X'$ bond is weaker than $X-X$ or $X'-X'$ bonds
 - (3) they are thermally more stable than halogen
 - (4) there is a large difference in their electronegativity
147. In electrophoresis the colloidal particles of As_2S_3 sol
- (1) moves towards anode
 - (2) moves towards cathode
 - (3) neither towards cathode nor towards anode
 - (4) both towards cathode and anode
148. The only actinoid element not exhibiting +3 oxidation state in its compounds:
- (1) Ac

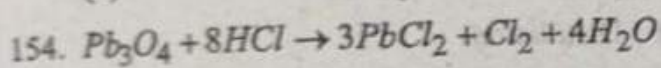
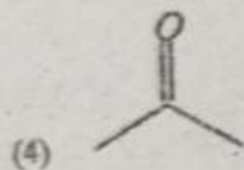
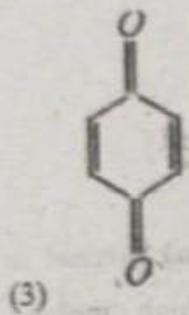
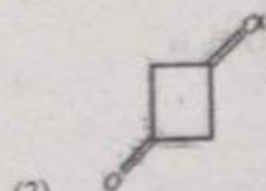
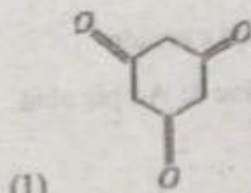
- (2) Th
- (3) Cf
- (4) Pu

149. The chirality of the compound



- (1) R
 - (2) S
 - (3) Z
 - (4) E
150. Solute 'A' is a ternary electrolyte (AB_2) and solute 'B' is a non electrolyte. If 0.1M solution of solute 'B' produces an osmotic pressure of '2p', then 0.05M solution of 'A' at the same temperature will produce an osmotic pressure equal to
- (1) 1.5p
 - (2) 2p
 - (3) 3p
 - (4) P
151. Chlorobenzene on treatment with sodium in dry ether gives diphenyl. The name of the reaction is
- (1) Fittig reaction
 - (2) Wurtz Fittig reaction
 - (3) Gattermann reaction
 - (4) Wurtz reaction
152. $[\text{H}_3\text{O}^+]$ of a solution is 10^{-8}M . Then pH of the solution is
- (1) 8
 - (2) 7.04
 - (3) 6.96
 - (4) 6

153. Which will undergoes enolisation more readily?



In the above reaction the number of moles of HCl are oxidised by one mole of PbO_2

- (1) 1
- (2) 4
- (3) 8
- (4) 2

155. Which among the following pair of species is isostructural?

- (1) PCl_5 & IF_5
- (2) H_3O^+ & NCl_3
- (3) SO_2 & XeF_2
- (4) SO_3 & XeO_3

156. A compound of formula A_3B_2 has the hcp

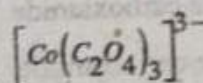
lattice which atom forms the hcp lattice and what fraction of tetrahedral voids is occupied by the other atoms

- (1) hcp lattice-A, 2/3 tetrahedral voids-B
- (2) hcp lattice-A, 1/3 tetrahedral voids-B
- (3) hcp lattice-B, 2/3 tetrahedral voids-A
- (4) hcp lattice-B, 1/3 tetrahedral voids-A

157. The IUPAC name of the Wilkinson's catalyst $[RhCl(PPh_3)_3]$ is

- (1) Chlorotris (triphenylphosphine) rhodium (I)
- (2) Chlorotris (triphenylphosphine) rhodium (IV)
- (3) Chlorotris (triphenylphosphine) rhodium (0)
- (4) Chlorotris(triphenylphosphine) rhodium (VI)

158. Pick out the correct statement with respect to



- (1) It is outer orbital complex, sp^3d^2 hybridized and diamagnetic in nature
- (2) It is inner orbital complex, d^2sp^3 hybridized and paramagnetic in nature
- (3) It is inner orbital complex, d^2sp^3 hybridized and diamagnetic in nature
- (4) It is outer orbital complex, sp^3d^2 hybridized and paramagnetic in nature

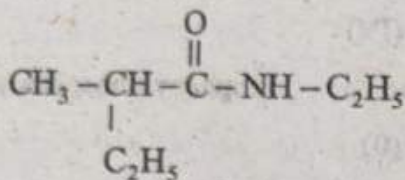
159. Wrong match is

- (1) Glycyl alaninedipeptide
- (2) AlanineNeutral amino acid
- (3) Insulin ...Globular protein
- (4) Glycine Optically active amino acid

160. The boiling points of water and ethyl alcohol are 373K and 351.3K respectively. The mixture of water and ethyl alcohol at certain composition forms azeotropic mixture and it shows positive deviation from Raoult's law. At what minimum temperature the mixture may boil ?

- (1) 390K
- (2) 351.3K
- (3) 373K
- (4) 350.15K

161. The IUPAC name of the compound is



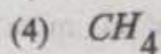
- (1) N-ethyl-2-ethyl propanamide
- (2) N-ethyl-2-methyl butanamide
- (3) N-ethyl-2-methyl propane carboxamide
- (4) N-ethyl-2-ethyl ethane carboxamide

162. The K.E of N molecule of O_2 is 'x' joules at -123°C . Another sample of O_2 at 327°C has a KE of '2x' joules. The latter sample contains

- (1) N molecules of O_2
- (2) 2N molecules of O_2
- (3) N/2 molecules of O_2
- (4) N/4 molecules of O_2

163. Which among CH_4 , SiH_4 , GeH_4 and SnH_4 is most volatile ?

- (1) SnH_4
- (2) SiH_4
- (3) GeH_4



164. The monomers of Butyl rubber are

- (1) Buta-1,3-diene & Vinyl cyanide
- (2) Hexamethylene diamine & Adipic acid
- (3) Isobutene & Isoprene
- (4) Phenol & formaldehyde

165. The conjugate acid of $\text{Zn}(\text{OH})_2$ is

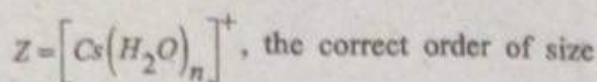
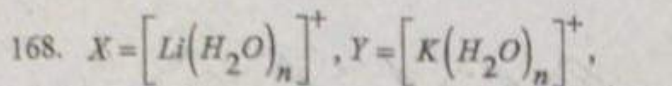
- (1) Zn^{+2}
- (2) $[\text{Zn}(\text{OH})]^+$
- (3) $[\text{Zn}(\text{OH})_3]^{-1}$
- (4) $[\text{Zn}(\text{O}_2\text{H})]^{+1}$

166. Which of the following refining method is used if a metal contains high melting impurities ?

- (1) Zone refining
- (2) Vapour phase refining
- (3) Distillation
- (4) Liquation

167. Which one of the following group shows maximum -I effect

- (1) $-\overset{\oplus}{\text{N}}\text{H}_3$
- (2) $-\overset{\oplus}{\text{N}}\text{H}_2\text{Me}$
- (3) $-\overset{\oplus}{\text{N}}\text{HMe}_2$
- (4) $-\overset{\oplus}{\text{N}}\text{Me}_3$



of these hydrated alkali ions

- (1) $X > Y > Z$
- (2) $Z > Y > X$
- (3) $X = Y = Z$
- (4) $Z > X > Y$

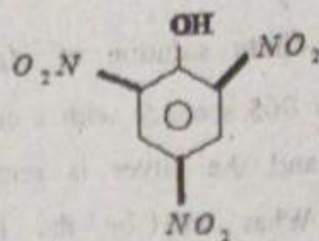
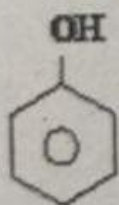
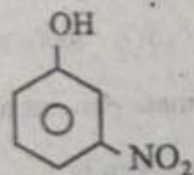
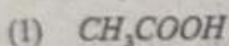
169. Incorrectly matched

- (1) Clemmensen reduction - Na-Hg/HCl
- (2) Mesityl oxide - formed in aldol condensation of acetone
- (3) Hemiacetal - alkoxy alkane
- (4) Gattermann - Koch reaction - CO + HCl / anhyd $AlCl_3$

170. Which of the following gives disproportionation reaction with conc. H_2SO_4

- (1) C
- (2) S
- (3) Cu
- (4) $C_{12}H_{22}O_{11}$

171. Most acidic among the following is



172. The number of P-O-P and P-O-H bonds present respectively in pyrophosphoric acid molecule

- (1) 1, 2
- (2) 2, 2
- (3) 1, 4
- (4) 1, 8

173. The following data is observed for the reaction $A + B \rightarrow AB$

[A]	[B]	Rate in M/sec
0.1M	0.1M	2.5×10^{-4}
0.2M	0.1M	5.0×10^{-4}
0.2M	0.2M	10×10^{-4}

The order of reaction is:

- (1) 0
- (2) 1
- (3) 2
- (4) 1.5

174. In Kjeldahl's method of estimation of nitrogen, $CuSO_4$ acts as

- (1) Oxidising agent
- (2) Reducing agent
- (3) Catalytic agent
- (4) Hydrolysis agent

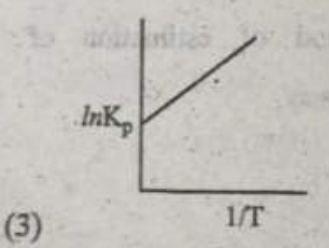
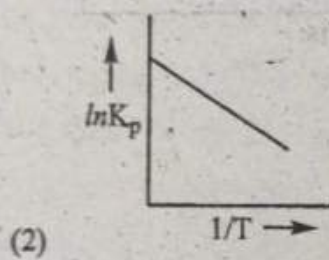
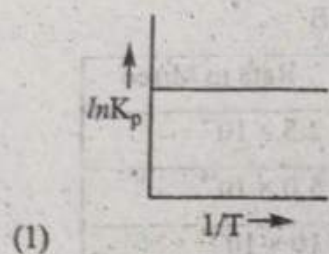
175. According to Fajan's rules, in which among the following polarisability is maximum?

- (1) $CaCl_2$
- (2) $CaBr_2$
- (3) CaF_2
- (4) CaI_2

176. A 100.0 mL dilute solution of Ag^+ is electrolyzed for 965 seconds with a current of 1.25 mA and the silver is removed completely. What will be the initial concentration (in molarity) of Ag^+

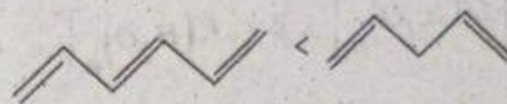
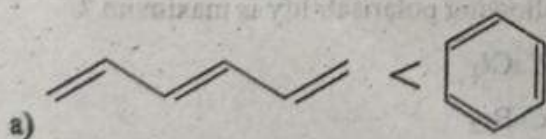
- (1) 2.50×10^{-1}
- (2) 2.32×10^{-4}
- (3) 2.32×10^{-3}
- (4) 1.25×10^{-4}

177. For an Exothermic reaction at equilibrium, the valid graphical data is

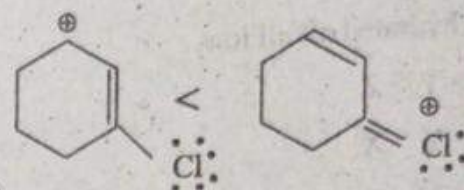


(4) All the above

178. According to the stability which of the following order is correct

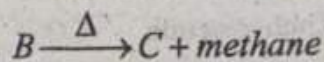
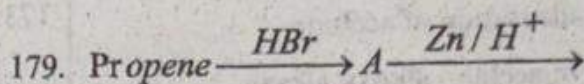


b)



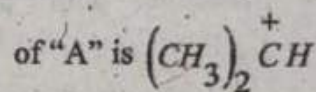
c)

- (1) a & b only
- (2) a & c only
- (3) b & c only
- (4) a, b, c



Incorrect statement is

(1) Intermediate formed in the formation



(2) B is propane

(3) C is ethane

(4) A $\xrightarrow{Na/ether}$ 2, 2, 3, 3-tetramethyl Butane

180. A sample of ozonised oxygen diffuses $\sqrt{2}$ times faster than pure SO_3 gas under identical conditions. The mass percent of O_3 in the sample of ozonised oxygen is

- (1) 60
- (2) 50
- (3) 40
- (4) 30

- BOT :** 1, 2, 5, 7, 9, 11, 13, 15, 17, 18, 19, 23, 25, 27, 29, 30, 33, 34, 37, 39, 41, 43, 45, 46, 47, 51, 53, 55, 57, 58, 59, 63, 65, 67, 68, 71, 72, 75, 77, 79, 80, 83, 84, 87, 89
ZOO : 3, 4, 6, 8, 10, 12, 14, 16, 20, 21, 22, 24, 26, 28, 31, 32, 35, 36, 38, 40, 42, 44, 48, 49, 50, 52, 54, 56, 60, 61, 62, 64, 66, 69, 70, 73, 74, 76, 78, 81, 82, 85, 86, 88, 90

BIOLOGY

1) 3	2) 4	3) 1	4) 2	5) 4	6) 4	7) 2	8) 4	9) 2	10) 3
11) 1	12) 3	13) 3	14) 1	15) 3	16) 2	17) 3	18) 3	19) 1	20) 1
21) 3	22) 2	23) 3	24) 1	25) 1	26) 3	27) 3	28) 4	29) 3	30) 3
31) 2	32) 4	33) 1	34) 1	35) 4	36) 1	37) 2	38) 2	39) 1	40) 4
41) 4	42) 3	43) 3	44) 2	45) 2	46) 1	47) 2	48) 2	49) 4	50) 2
51) 1	52) 1	53) 4	54) 3	55) 1	56) 1	57) 1	58) 4	59) 3	60) 1
61) 2	62) 4	63) 2	64) 1	65) 3	66) 4	67) 1	68) 2	69) 2	70) 3
71) 2	72) 1	73) 3	74) 3	75) 2	76) 2	77) 1	78) 4	79) 1	80) 2
81) 1	82) 1	83) 3	84) 1	85) 3	86) 2	87) 4	88) 2	89) 4	90) 4

PHYSICS

91) 1	92) 1	93) 1	94) 4	95) 3	96) 3	97) 1	98) -2	99) 2	100) 4
101) 2	102) 3	103) 2	104) 2	105) 4	106) 2	107) 3	108) 2	109) 2	110) 2
111) 2	112) 1	113) 1	114) 4	115) 4	116) 3	117) 3	118) 1	119) 3	120) 1
121) 4	122) 4	123) 1	124) 1	125) 1	126) 2	127) 3	128) 4	129) 2	130) 2
131) 3	132) 4	133) 2	134) 3	135) 4					

CHEMISTRY

136) 4	137) 1	138) 4	139) 2	140) 3	141) 1	142) 3	143) 3	144) 2	145) 1
146) 2	147) 1	148) 2	149) 1	150) 3	151) 1	152) 1	153) 1	154) 4	155) 2
156) 2	157) 1	158) 3	159) 4	160) 4	161) 2	162) 3	163) 4	164) 3	165) 2
166) 4	167) 4	168) 1	169) 3	170) 2	171) 4	172) 3	173) 3	174) 3	175) 4
176) 4	177) 3	178) 2	179) 4	180) 2					

PHYSICS SOLUTIONS

91. $[RCh] = [Energy] = [Li^2] = \left[L \left(\frac{v}{r} \right)^2 \right]$

92. $s_{AB} = u_{AB}t + \frac{1}{2}a_{AB}t^2$
 $t = 10s$

93. $\vec{V}_x = (12\hat{i} - 12\hat{k})$

$\vec{V}_x = \frac{4V}{5}\hat{i} + \frac{3}{5}V\hat{k}$

$\vec{V}_{Rx} = V_2(-\hat{k}) \Rightarrow 12 = \frac{4V}{5}$

$V = 15ms^{-1}$

94. Area under v-t graph = displacement

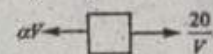
95. $R = \frac{u^2}{g} = 200m$

$H = \frac{u^2}{4g} = 50 \Rightarrow \vec{r} = (100\hat{i} + 50\hat{j})$

96. $F_{net} = 5N$, at 60° with initial velocity

97. $KE = \frac{1}{2} \times 1 \times (2-1)^2 + \frac{1}{2} \times 1 \times (3+2)^2$

$= \frac{1}{2} \times 1 + \frac{1}{2} \times 25 = 13J$



98. $F_{net} = 0 \Rightarrow \alpha V = \frac{20}{V}$

99. $\frac{dv}{dt} = 9 \Rightarrow dv = 9dt \Rightarrow V = 9t$

$a_c = a_t \Rightarrow \frac{v^2}{r} = a_t$

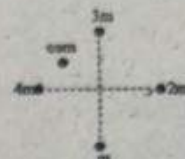
$\Rightarrow \frac{(9t)^2}{4} = 9$

$t^2 = \frac{9 \times 4}{9 \times 9} \Rightarrow t = \frac{2}{3}s$

100. $\Delta KE = \frac{1}{2} \frac{m_1 m_2}{m_1 + m_2} (u_1 - u_2)^2 (1 - e^2)$

$e^2 = \frac{1}{2}$

101.



102. $mg h_1 = \frac{1}{2} m v^2 \left(\frac{3}{2} \right) \& mg h_2 = \frac{1}{2} m v^2$

103. $g_A = \frac{4}{3} \pi G \frac{R}{2} \rho$

$g_B = \frac{4GM}{9R^2} \Rightarrow g_A : g_B = 9 : 8$

104. $y = \frac{n_1 C_{p1} + n_2 C_{p2}}{n_1 C_{v1} + n_2 C_{v2}} = \frac{3 \times \frac{8}{2} R + 2 \times \frac{5}{2} R}{3 \times \frac{6R}{2} + 2 \times \frac{3R}{2}}$

$= \frac{17}{12} = 1.42$

105. $PV = \frac{2}{3} E \Rightarrow E = \frac{3}{2} \times 3 \times 10^6 \times 2$

$= 9 \times 10^6 J$

106. Angle of repose $\alpha = \tan^{-1}(\mu)$ remains same

107. $KE_{avg} = \frac{1}{4} m \omega^2 R^2 = \frac{1}{2} KE_{max}$

Average speed $= \frac{4\Delta s}{2\pi} = \frac{2}{\pi} V_{max}$

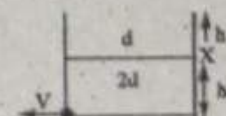
108. $(F_2)_{minimum} = F_{minimum}$

$\pi R^2 y \rho g = ma$ but $mg = \frac{2}{3} \pi R^3 \rho g$

$\therefore \pi R^2 \rho g y = \frac{2}{3} \pi R^3 \rho a$

$a = \left(\frac{3g}{2R} \right) y \Rightarrow T = 2\pi \sqrt{\frac{2R}{3g}}$

109.



$P_3 + h d g + h 2d g = P_1 + 0 + \frac{1}{2} (2d) v^2$

$3h d g = d v^2 \Rightarrow v^2 = 3gh$

but $F = A(2d)v^2 = 6Adgh$

110. $\alpha = 0.5 \Rightarrow$ perfectly incompressible

$\Rightarrow B = \text{infinity}$

111. Conceptual

$$112. \left(\frac{dQ}{dt}\right)_{AB} = \left(\frac{dQ}{dt}\right)_{CA}$$

$$\frac{100 - \theta}{1} = \frac{0 - 20}{1} \Rightarrow \theta = 60^\circ C$$

$$113. \mu = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\frac{A}{2}} \text{ If } \mu \text{ increases } D \text{ also}$$

increases

$$114. e = e_0 \sin(\omega t)$$

at $t = T/4$, 'e' is maximum

at $t = T/2$, e is minimum

$$115. \frac{f_1}{f_2} = \left(\frac{\mu_2 - 1}{\mu_1 - 1}\right) \Rightarrow f_1 = -20 \text{ cm}$$

116. Conceptual

$$117. a \sin \theta = n\lambda \Rightarrow a \sin 60 = 2\lambda$$

$$a \sin \theta = \lambda \Rightarrow \frac{\sin \theta}{\sin 60} = \frac{1}{2}$$

$$\sin \theta = \frac{\sqrt{3}}{4} = 0.433$$

$$\theta < 30^\circ$$

118. Conceptual

119. Speed of 'e' in EF increases but it remains same in MF $\Rightarrow \lambda_1 < \lambda_2$

$$120. r_n = \frac{n^2 h^2 \epsilon_0}{2\pi^2 m} \Rightarrow 1 = \frac{n^2}{(3)(206)}$$

$$n = 25$$

$$121. \frac{2N_0}{3} = N_0 e^{-\lambda t}$$

$$\frac{N_0}{3} = N_0 e^{-\lambda t} \Rightarrow 2 = e^{\lambda(t_2 - t_1)}$$

$$\ln 2 = \lambda(t_2 - t_1)$$

$$(t_2 - t_1) = \frac{\ln 2}{\lambda} = 50 \text{ days}$$

122. Emitter base junction is to be forward biased and base - collector junction is to be reverse biased

123. Conceptual

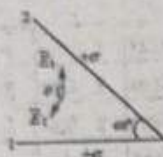
$$124. \text{ For damped oscillator } m \frac{d^2 x}{dt^2} + b \frac{dx}{dt} + Kx = 0$$

For series LCR circuit

$$L \left(\frac{d^2 q}{dt^2} \right) + R \frac{dq}{dt} + \frac{1}{C} q = 0$$

$$\Rightarrow m \rightarrow L, b \rightarrow R \text{ and } K \rightarrow \frac{1}{C}$$

125.



$$E_1 = E_2, \theta = 120$$

$$E_{\text{net}} = 2E \cos 60 = E$$

$$= \frac{\sigma}{2\epsilon_0}$$

126. $W = \Delta Fq$

$$127. \frac{R+r}{R} = \frac{60}{50} \Rightarrow r = \left(\frac{10}{50}\right) 6\Omega = 1.2\Omega$$

$$128. \tan \delta = \frac{\tan D}{\cos D}$$

$$129. B_{\text{min}} = 0, B_{\text{max}} \neq 0$$

$$130. B = \frac{\mu_0}{2r} \left(\frac{qv}{2\pi r} \right) \& L = mvr$$

$$\Rightarrow B = \frac{\mu_0}{4\pi r^2} \left(\frac{L}{mr} \right)$$

$$B = \left(\frac{\mu_0 q}{4\pi r^3 m} \right) L$$

131. Conceptual

$$132. B = \frac{\mu_0 n i}{2r} = \frac{\mu_0 n}{2r} \left(\frac{VA}{\rho n 2\pi r} \right)$$

$$133. V = \frac{1}{4\pi\epsilon_0} \left(\frac{q_1}{r} - \frac{q_1}{2r} + \frac{q+q_1}{2r} \right) = 0$$

$$\frac{q_1}{r} - \frac{q_1}{2r} \Rightarrow q_1 = \frac{-q}{2}$$

$$\phi = \frac{-q}{2\epsilon_0}$$

$$134. n_1 = n_2 \Rightarrow \frac{P_1}{r_1} = \frac{P_2}{r_2} \Rightarrow \frac{P_1}{P_2} = \frac{1}{2}$$

$$135. V = \left(\frac{\Delta\lambda}{\lambda} \right) C = \frac{3 \times 10^8}{6 \times 10^7} = 5 \times 10^4$$