

Text Booklet Code

PLATFORM

No..MOCK07/PCB



This Test Booklet contains 23 Pages

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

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** ballpoint pen only.
2. The test is of **3 hours** duration and 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 score. 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 Test Booklet only with them.*
6. The CODE for this Test Booklet is **AA**. Make 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 candidate 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.
9. Each candidate must show on demand his / her Admit Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his / her seat.
11. 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.**
12. Use of Electronic / Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet.

Name of the Candidate (in Capitals): _____

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Centre of Examination (in Capitals): _____

Candidate's Signature: _____ Invigilator's Signature: _____

Facsimile Signature Stamp of

Centre Superintendent: _____

BIOLOGICAL SCIENCE

001. An element playing important role in nitrogen fixation is

- (1) Molybdenum
- (2) Copper
- (3) Manganese
- (4) Zinc

002. Select the correct statement from the ones given below:

- (1) Barbiturates when given to criminals make them tell the truth
- (2) Morphine is often given to persons who have undergone surgery as a pain killer.
- (3) Chewing tobacco lowers blood pressure and heart rate
- (4) Cocaine is given to patients after surgery as it stimulates recovery

003. Listed below are four respiratory capacities (a – d) and four jumbled respiratory volumes of a normal human adult: Respiratory capacities volumes.

- (1) Residual volume 2500 mL
- (2) Vital capacity 3500 mL
- (3) Inspiratory reserve volume 1200 mL
- (4) Inspiratory capacity 4500 mL

Which one of the following is the correct matching of two capacities and volumes?

- (1) (b) 2500 mL, (c) 4500 mL
- (2) (c) 1200 mL, (d) 2500 mL
- (3) (d) 3500 mL, (a) 1200 mL
- (4) (a) 4500 mL, (b) 3500 mL

004. Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called:

- (1) Xenogamy
- (2) Geitonogamy
- (3) Karyogamy
- (4) Autogamy

005. ABO blood groups in humans are controlled by the gene I. It has three alleles – I^A , I^B and i. Since there are three different alleles, six different genotypes are possible. How many phenotypes can occur?

- (1) Three
- (2) One
- (3) Four
- (4) Two

006. Low Ca^{++} in the body fluid may be the cause of:

- (1) Tetany
- (2) Anaemia
- (3) Angina pectoris
- (4) Gout

007. The nerve centres which control the body temperature and the urge for eating are contained in:

- (1) Hypothalamus
- (2) Pons
- (3) Cerebellum
- (4) Thalamus

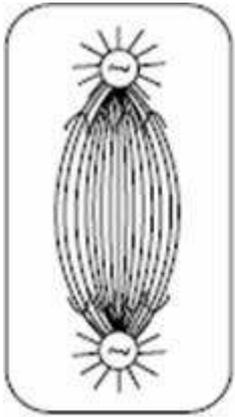
008. During mitosis ER and nucleolus begin to disappear at:

- (1) Late prophase
- (2) Early metaphase
- (3) Late metaphase
- (4) Early prophase

009. Darwin's finches are a good example of:

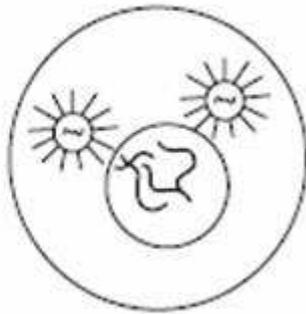
- (1) Industrial melanism
- (2) Connecting link
- (3) Adaptive radiation
- (4) Convergent evolution

010. Which stages of cell division do the following figures A and B represent respectively?



A

Fig. A



B

Fig. B

- (1) Metaphase – Telophase
- (2) Telophase minus; Metaphase
- (3) Late Anaphase – Prophase
- (4) Prophase – Anaphase

011. The common nitrogen-fixer in paddy fields is:

- (1) Rhizobium
- (2) Azospirillum
- (3) Oscillatoria
- (4) Frankia

012. Which two of the following changes (a – d) usually tend to occur in the plain dwellers when they move to high altitudes (3,500 m or more)?

- a. Increase in red blood cell size
 - b. Increase in red blood cell production
 - c. Increased breathing rate
 - d. Increase in thrombocyte count
- Changes occurring are :

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

013. What is true about RBCs in humans?

- (1) They carry about 20 – 25 per cent of CO₂
- (2) They transport 99.5 per cent of O₂
- (3) They transport about 80 per cent oxygen only and the rest 20 per cent of it is transported in dissolved state in blood plasma
- (4) They do not carry CO₂ at all

014. The main arena of various types of activities of a cell is:

- (1) Plasma membrane
- (2) Mitochondrion
- (3) Cytoplasm
- (4) Nucleus

015. If for some reason our goblet cells are non-functional, this will adversely affect:

- (1) production of somatostatin
- (2) secretion of sebum from the sebaceous glands
- (3) maturation of sperms
- (4) smooth movement of food down the intestine

016. The plasma membrane consists mainly of

- (1) phospholipids embedded in a protein bilayer
- (2) proteins embedded in a phospholipid bilayer

(3) proteins embedded in a polymer of glucose molecules

(4) proteins embedded in a carbohydrate bilayer

017. The scutellum observed in a grain of wheat or maize is comparable to which part of the seed in other monocotyledons?

- (1) Cotyledon
- (2) Endosperm
- (3) Aleurone layer
- (4) Plumule

018. The energy – releasing metabolic process in which substrate is oxidised without an external electron acceptor is called

- (1) Glycolysis
- (2) Fermentation
- (3) Aerobic respiration
- (4) Photorespiration

019. Photoperiodism was first characterised in

- (1) Tobacco
- (2) Potato
- (3) Tomato
- (4) Cotton

020. The second maturation division of the mammalian ovum occurs

- (1) Shortly after ovulation before the ovum makes entry into the Fallopian tube
- (2) Until after the ovum has been penetrated by a sperm
- (3) Until the nucleus of the sperm has fused with that of the ovum
- (4) in the Graafian follicle following the first maturation division

021. Satellite DNA is useful tool in

- (1) Organ transplantation
- (2) Sex determination
- (3) Forensic science
- (4) Genetic engineering

022. Which one of the following does not follow the central dogma of molecular biology?

- (1) Pea
- (2) Mucor
- (3) Chlamydomonas
- (4) HIV

023. Which one of the following statements about human sperm is correct?

- (1) Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilisation
- (2) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilisation
- (3) Acrosome serves as a sensory structure leading the sperm towards the ovum
- (4) Acrosome serves no particular function

024. The genetically-modified (GM) brinjal in India has been developed for

- (1) Insect-resistance
- (2) Enhancing shelf life
- (3) Enhancing mineral content
- (4) Drought-resistance

025. Apomictic embryos in citrus arise from

- (1) Synergids
- (2) Maternal sporophytic tissue in ovule
- (3) Antipodal cells
- (4) Diploid egg

026. One example of animals having a single opening to the outside that serves both as mouth as well as anus is:

- (1) Octopus
- (2) Asterias
- (3) Ascidia
- (4) Fasciola

027. Membrane-bound organelles are absent in

- (1) Saccharomyces
- (2) Streptococcus
- (3) Chlamydomonas
- (4) Plasmodium

028. Keel is characteristic of the flowers of

- (1) Gulmohur
- (2) Cassia
- (3) Calotropis
- (4) Bean

029. The kind of epithelium which forms the inner walls of blood vessels is

- (1) cuboidal epithelium
- (2) columnar epithelium
- (3) ciliated columnar epithelium
- (4) squamous epithelium

030. Which one of the following has its own DNA?

- (1) Mitochondria
- (2) Dictyosome
- (3) Lysosome
- (4) Peroxisome

031. Select the correct statement from the following

- (1) Biogas is produced by the activity of aerobic bacteria on animal waste
- (2) Methanobacterium is an aerobic bacterium found in rumen of cattle
- (3) Biogas, commonly called gobar gas, is pure methane
- (4) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria

032. Study the four statements (a – d) given below and select the two correct ones out of them

- (a) A lion eating a deer and a sparrow feeding on grain are ecologically similar in being

consumers

- (b) Predator star fish *Pisaster* helps in maintaining species diversity of some invertebrates
- (c) Predators ultimately lead to the extinction of prey species.
- (d) Production of chemicals such as nicotine, strychnine by the plants are metabolic disorders

The two correct statements are

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

033. Breeding of crops with high levels of minerals, vitamins and proteins is called

- (1) Somatic hybridisation
- (2) Biofortification
- (3) Biomagnification
- (4) Micropropagation

034. Widal test is used for the diagnosis of

- (1) Malaria
- (2) Pneumonia
- (3) Tuberculosis
- (4) Typhoid

035. In vitro fertilisation is a technique that involves transfer of which one of the following into the fallopian tube?

- (1) Embryo only, upto 8 cell stage
- (2) Either zygote or early embryo upto 8 cell stage
- (3) Embryo of 32 cell stage
- (4) Zygote only

036. Which one of the following structures between two adjacent cells is an effective transport pathway?

- (1) Plasmodesmata
- (2) Plastoquinones

(3) Endoplasmic reticulum

(4) Plasmalemma

037. Single-celled eukaryotes are included in

(1) Protista

(2) Fungi

(3) Archaea

(4) Monera

038. In unilocular ovary with a single ovule the placentation is

(1) Marginal

(2) Basal

(3) Free Central

(4) Axile

039. Sertoli cells are found in:

(1) ovaries and secrete progesterone

(2) adrenal cortex and secrete adrenaline

(3) seminiferous tubules and provide nutrition to germ cells

(4) pancreas and secrete cholecystokinin

040. Which one of the following cannot be explained on the basis of Mendel's Law of Dominance?

(1) The discrete unit controlling a particular character is called a factor

(2) Out of one pair of factors one is dominant, and the other recessive

(3) Alleles do not show any blending and both the characters recover as such in F_2 generation.

(4) Factors occur in pair

041. The chief water conducting elements of xylem in gymnosperms are

(1) Vessels

(2) Fibres

(3) Transfusion tissue

(4) Tracheids

042. Ringworm in humans is caused by

(1) Bacteria

(2) Fungi

(3) Nematodes

(4) Viruses

043. Which one of the following is not a micronutrient?

(1) Molybdenum

(2) Magnesium

(3) Zinc

(4) Boron.

044. Vasa efferentia are the ductules leading from

(1) Testicular lobules to rete testis

(2) Rete testis to vas deferens

(3) Vas deferens to epididymis

(4) Epididymis to urethra

045. Select the two correct statements out of the four (a – d) given below about lac operon.

(a) Glucose or galactose may bind with the repressor and inactivate it

(b) In the absence of lactose the repressor binds with the operator region

(c) The z-gene codes for permease

(d) This was elucidated by Francois Jacob and Jacques Monod.

The correct statements are:

(1) (b) and (c)

(2) (a) and (c)

(3) (b) and (d)

(4) (a) and (b)

046. The genotype of a plant showing the dominant phenotype can be determined by:

(1) Test cross (2) Dihybrid cross

(3) Pedigree analysis (4) Back cross

047. PGA as the first CO_2 fixation product was discovered in photosynthesis of:

(1) Bryophyte (2) Gymnosperm

- (3) Angiosperm (4) Alga

048. Seminal plasma in human males is rich in

- (1) fructose and calcium
- (2) glucose and calcium
- (3) DNA and testosterone
- (4) ribose and potassium

049. A common biocontrol agent for the control of plant diseases is

- (1) Baculovirus
- (2) Bacillus thuringiensis
- (3) Glomus
- (4) Trichoderma

050. Injury to adrenal cortex is not likely to affect the secretion of which one of the following?

- (1) Aldosterone
- (2) Both Androstenedione and Dehydroepiandrosterone
- (3) Adrenaline
- (4) Cortisol

051. Which one of the following pairs is incorrectly matched?

- (1) Glucagon – Beta cells (source)
- (2) Somatostatin – Delta cells (source)
- (3) Corpus luteum – Relaxin (secretion)
- (4) Insulin – Diabetes mellitus (disease)

052. Select the correct statement from the ones given below with respect to dihybrid cross

- (1) Tightly linked genes on the same chromosome show higher recombinations
- (2) Genes far apart on the same chromosome show very few recombinations
- (3) Genes loosely linked on the same chromosome show similar recombinations as the tightly linked ones

- (4) Tightly linked genes on the same chromosome show very few recombinations.

053. Which one of the following statements in regard to the excretion by the human kidneys is correct?

- (1) Descending limb of Loop of Henle is impermeable to water
- (2) Distal convoluted tubule is incapable of reabsorbing HCO_3
- (3) Nearly 99 per cent of the glomerular filtrate is reabsorbed by the renal tubules
- (4) Ascending limb of Loop of Henle is impermeable to electrolytes

054. The biomass available for consumption by the herbivores and the decomposers is called

- (1) Net primary productivity
- (2) Secondary productivity
- (3) Standing crop
- (4) Gross primary productivity

055. If due to some injury the chordae tendinae of the tricuspid valve of the human heart is partially non-functional, what will be the immediate effect?

- (1) The flow of blood into the aorta will be slowed down
- (2) The 'pacemaker' will stop working
- (3) The blood will tend to flow back into the left atrium
- (4) The flow of blood into the pulmonary artery will be reduced

056. Ovary is half-inferior in the flowers of

- (1) Guava
- (2) Plum
- (3) Brinjal
- (4) Cucumber

057. Which one of the following is used as vector for cloning genes into higher organisms ?

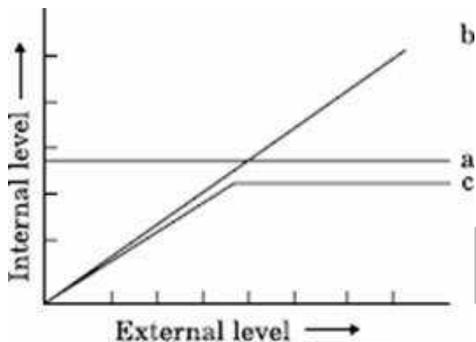
- (1) Baculovirus
- (2) Salmonella typhimurium
- (3) Rhizopus nigricans
- (4) Retrovirus

058. The one aspect which is not a salient feature of genetic code, is its being:

- (1) Degenerate
- (2) Ambiguous
- (3) Universal
- (4) Specific

059. Which one of the following is an example of ex-situ conservation?

- (1) Wildlife sanctuary



- (2) Seed bank
- (3) Sacred groves
- (4) National park

060. Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?

- (1) 5' ————— CGTTCG ————— 3'
3' ————— ATGGTA ————— 5'
- (2) 5' ————— GATATG ————— 3'
3' ————— CTAATA ————— 5'
- (3) 5' ————— GAATTC ————— 3'
3' ————— CTTAAG ————— 5'
- (4) 5' ————— CACGTA ————— 3'
3' ————— CTCAGT ————— 5'

061. Which one of the following statements is correct with respect to AIDS?

- (1) The HIV can be transmitted through eating food together with an infected person
- (2) Drug addicts are least susceptible to HIV infection
- (3) AIDS patients are being fully cured cent per cent with proper care and nutrition
- (4) The causative HIV retrovirus enters helper T-lymphocytes thus reducing their numbers.

062. Phototropic curvature is the result of uneven distribution of

- (1) Gibberellin
- (2) Phytochrome
- (3) Cytokinins
- (4) Auxin

063. The Figure given below is a diagrammatic representation of response of organisms to biotic factors. What do a, b and c represent respectively?

- | | (a) | (b) | (c) |
|-----------------------|-----------------|-------------------|-----------|
| (1) Conformer | regulator | partial regulator | regulator |
| (2) regulator | partial Regular | conformer | conformer |
| (3) partial regulator | regular | conformer | Regulator |
| (4) regulator | conformer | partial Regulator | Regulator |

064. Male and female gametophytes are independent and free-living in

- (1) Mustard
- (2) Castor
- (3) Pinus
- (4) Sphagnum

065. The technical term used for the androecium in a flower of China rose

(Hibiscus rosasinensis) is

- (1) Monadelphous
- (2) Diadelphous
- (3) Polyandrous
- (4) Polyadelphous

066. Virus envelope is known as

- (1) Capsid
- (2) Virion
- (3) Nucleoprotein
- (4) Core

067. The permissible use of the technique amniocentesis is for

- (1) detecting sex of the unborn foetus
- (2) artificial insemination
- (3) transfer of embryo into the uterus of the surrogate mother
- (4) detecting any genetic abnormality

068. One of the free-living, anaerobic nitrogen-fixers is

- (1) Beijerinckia
- (2) Rhodospirillum
- (3) Rhizobium
- (4) Azotobacter

069. DNA or RNA segment tagged with a radioactive molecule is called:

- (1) Vector
- (2) Probe
- (3) Clone
- (4) Plasmid

070. The signals for parturition originate from:

- (1) placenta only
- (2) placenta as well as fully developed foetus
- (3) oxytocin released from maternal pituitary
- (4) fully developed foetus only

071. The principal nitrogenous excretory

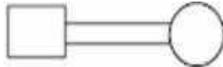
compound in humans is synthesised

- (1) in kidneys but eliminated mostly through liver
- (2) in kidneys as well as eliminated by kidneys
- (3) in liver and also eliminated by the same through bile
- (4) in the liver, but eliminated mostly through kidneys

072. Carrier ions like Na^+ facilitate the absorption of substances like

- (1) amino acids and glucose
- (2) glucose and fatty acids
- (3) fatty acids and glycerol
- (4) fructose and some amino acids

073. Which one of the following symbols and its representation, used in human pedigree analysis is correct?

- (1)  = mating between relatives
- (2)  = unaffected male
- (3)  = unaffected female
- (4)  = male affected

074. Toxic agents present in food which interfere with thyroxine synthesis lead to the development of

- (1) toxic goitre
- (2) cretinism
- (3) simple goiter
- (4) thyrotoxicosis

075. Which one of the following statements about all the four of Spongilla, Leech, Dolphin and Penguin is correct?

- (1) Penguin is homiothermic while the remaining three are poikilothermic
- (2) Leech is a fresh water form while all

others are marine

- (3) Spongilla has special collared cells called choanocytes, not found in the remaining three

- (4) All are bilaterally symmetrical

076. The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?

- (1) Fourth month
(2) Fifth month
(3) Sixth month
(4) Third month

077. Which one of the following kinds of animals are triploblastic?

- (1) Flat worms
(2) Sponges
(3) Ctenophores
(4) Corals

078. Which one of the following statements about certain given animals is correct?

- (1) Round worms (Aschelminthes) are pseudocoelomates
(2) Molluscs are acoelomates
(3) Insects are pseudocoelomates
(4) Flat worms (Platyhelminthes) are coelomates

079. Cu ions released from copper – releasing Intra Uterine Devices (IUDs)

- (1) make uterus unsuitable for implantation
(2) increase phagocytosis of sperms
(3) suppress sperm motility
(4) prevent ovulation

080. Restriction endonucleases are enzymes which

- (1) make cuts at specific positions within the DNA molecule
(2) recognize a specific nucleotide sequence for binding of DNA

ligase

- (3) restrict the action of the enzyme DNA polymerase
(4) remove nucleotides from the ends of the DNA molecule

081. Which one of the following is not a lateral meristem?

- (1) Intrafascicular cambium
(2) Interfascicular cambium
(3) Phellogen
(4) Intercalary meristem

082. A renewable exhaustible natural resource is

- (1) Coal
(2) Petroleum
(3) Minerals
(4) Forest

083. C₄ plants are more efficient in photosynthesis than C₃ plants due to

- (1) Higher leaf area
(2) Presence of larger number of chloroplasts in the leaf cells
(3) Presence of thin cuticle
(4) Lower rate of photorespiration

084. Algae have cell wall made up of

- (1) Cellulose, galactans and mannans
(2) Hemicellulose, pectins and proteins
(3) Pectins, cellulose and proteins
(4) Cellulose, hemicellulose and pectins

085. Some hyperthermophilic organisms that grow in highly acidic (pH2) habitats belong to the two groups

- (1) Eubacteria and archaea
(2) Cyanobacteria and diatoms
(3) Protists and mosses
(4) Liverworts and yeasts

86. Genetic engineering has been successfully used for producing

- (1) transgenic mice for testing safety of polio vaccine before use in humans
- (2) transgenic models for studying new treatments for certain cardiac diseases
- (3) transgenic Cow – Rosie which produces high fat milk for making ghee
- (4) animals like bulls for farm work as they have super power

087. Some of the characteristics of Bt cotton are

- (1) Long fibre and resistance to aphids
- (2) Medium yield, long fibre and resistance to beetle pests
- (3) High yield and production of toxic protein crystals which kill dipteran pests
- (4) High yield and resistance to bollworms

088. Heartwood differs from sapwood in

- (1) Presence of rays and fibres
- (2) Absence of vessels and parenchyma
- (3) Having dead and non-conducting elements
- (4) Being susceptible to pests and pathogens

089. Consider the following four statements (a – d) regarding kidney transplant and select the two correct ones out of these.

- (a) Even if a kidney transplant is proper the recipient may need to take immuno-suppressants for a long time
- (b) The cell-mediated immune response is responsible for the graft rejection
- (c) The B-lymphocytes are responsible for rejection of the graft
- (d) The acceptance or rejection of a kidney transplant depends on specific interferons

The two correct statements are:

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

090. Wind pollinated flowers are

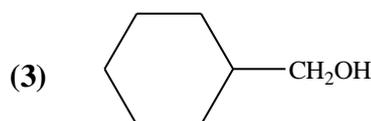
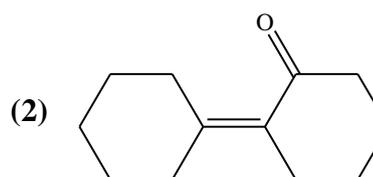
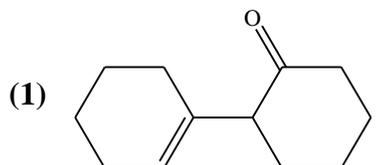
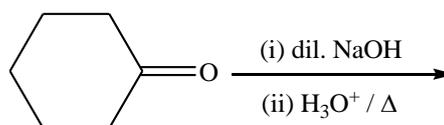
- (1) small, brightly coloured, producing large number of pollen grains
- (2) small, producing large number of dry pollen grains
- (3) large producing abundant nectar and pollen
- (4) small, producing nectar and dry pollen

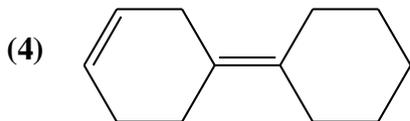
Subject: CHEMISTRY

091. If the solubility of lithium sodium hexa fluoro aluminate $\text{Li}_3\text{Na}_3(\text{AlF}_6)_2$ is S mol/L, its solubility product is

- (1) S^2
- (2) $2112S^2$
- (3) $208S^6$
- (4) $2916S^8$

092. The final product of the following reaction is





093. Which of the following compounds of phosphorus contain P – O – P bond?

- (I) Pyrophosphorous acid
 (II) Hypophosphoric acid
 (III) Metaphosphoric acid
 (IV) Orthophosphorous acid
- (1) I only (2) I & III only
 (3) II & IV only (4) III only

094. 0.037 gm of an alcohol, R – OH was added to CH_3MgBr and the gas evolved measured 11.2 mL at STP. The molecular mass of R-OH will be

- (1) 47 (2) 79
 (3) 74 (4) 77

095. One mole of a non ideal gas undergoes a change of state (2 atm, 3L, 95K) \rightarrow (4 atm, 5L, 245K) with a change in internal energy, " $\Delta U=30$ Latm. The change in enthalpy (ΔH) of the process in Latm is

- (1) 40
 (2) 42.3
 (3) 44
 (4) Not defined because pressure is not constant

096. A metal M readily forms water soluble sulphate MSO_4 , water insoluble hydroxide M(OH)_2 and oxide MO which becomes inert on heating. The hydroxide is soluble in NaOH. Thus M is

- (1) Mg (2) Sr
 (3) Be (4) Ca

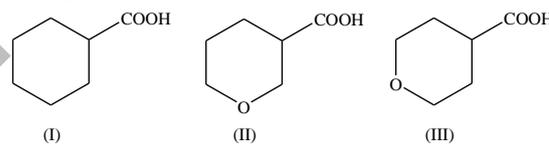
097. The oxidation number, d-orbital occupation and coordination number of Cr in the complex $\text{cis-[Cr(en)}_2\text{Cl}_2\text{]Cl}$ are respectively

- (1) + 3, 3d and 4 (2) + 3, 4d and 6
 (3) + 3, 3d and 6 (4) + 2, 3d and 6

098. Atmospheric pressure is 76 cm Hg and pressure of the gas is 77 cm Hg. Hence, height 'h' of the mercury column is open arm is

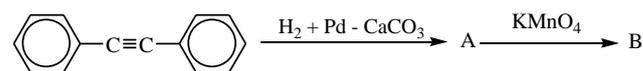
- (1) 1 cm (2) $\frac{1}{13.6 \times 980}$ cm
 (3) 153 cm (4) $1 \times 1.36 \times 980$ cm

099. The correct order of strengths of the carboxylic acids



- (1) I > II > III
 (2) II > III > I
 (3) III > II > I
 (4) II > I > III

100.



What is A & B?

- (1) $\text{C}_6\text{H}_5\text{CH} = \text{CHC}_6\text{H}_5$, $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$
 (2) $\text{C}_6\text{H}_5\text{CH} = \text{CH}-\text{C}_6\text{H}_5$, $\text{C}_6\text{H}_5\text{COOH}$
 (3) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$, $\text{C}_6\text{H}_5\text{CHO}$
 (4) $\text{C}_6\text{H}_5\text{CH} = \text{CHC}_6\text{H}_5$, $\text{C}_6\text{H}_5\text{CHO}$

101. Identify the correct statement

- (1) FeI_3 is stable in aqueous solution
- (2) An acidified solution of $\text{K}_2\text{Cr}_2\text{O}_7$ gives yellow precipitate on mixing with lead acetate.
- (3) The species $[\text{CuCl}_4]^{2-}$ exists but $[\text{CuI}_2]^{2-}$ does not
- (4) Both copper (I) and copper (II) salts are known in aqueous solution.

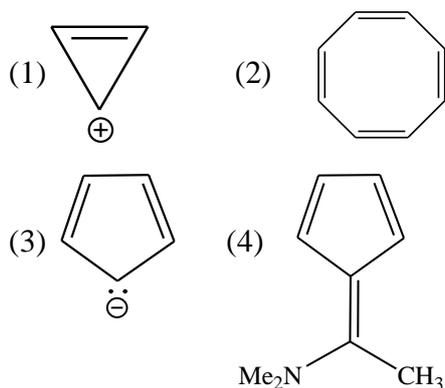
102. The amount of energy required to remove the electron from a Li^{+2} ion in its ground state is how many times greater than the amount of energy needed to remove the electron from an H-atom in its ground state?

- (1) 2
- (2) 9
- (3) 4
- (4) 6

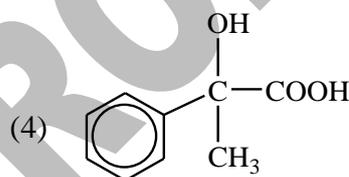
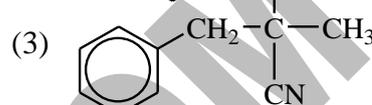
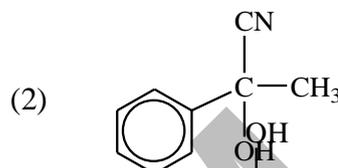
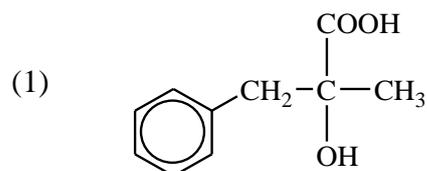
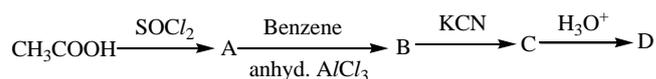
103. An organic compound $\text{C}_3\text{H}_9\text{N}$ (A) when treated with nitrous acid, gave an alcohol and N_2 gas was evolved. (A) on warming with CHCl_3 and KOH gave (C) which on reduction gave isopropyl methylamine. Predict the structure of (A)

- (1) $\begin{array}{c} \text{H}_3\text{C} \\ \diagdown \\ \text{CH}-\text{NH}_2 \\ \diagup \\ \text{H}_3\text{C} \end{array}$
- (2) $\text{CH}_3\text{CH}_2\text{NH}-\text{CH}_3$
- (3) $\begin{array}{c} \text{H}_3\text{C}-\text{N}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
- (4) $\text{CN}_3\text{CH}_2\text{CH}_2-\text{NH}_2$

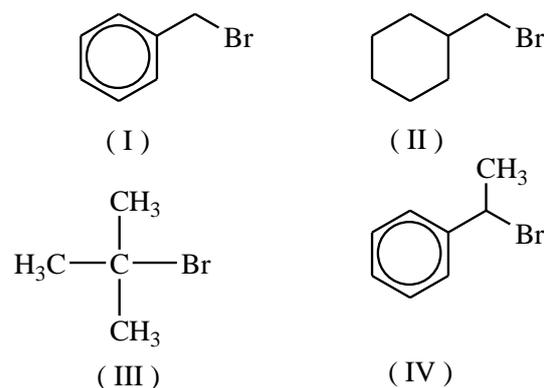
104. From the following compounds choose the one which is not aromatic



105. In a set of reactions CH_3COOH yielded a product (D)

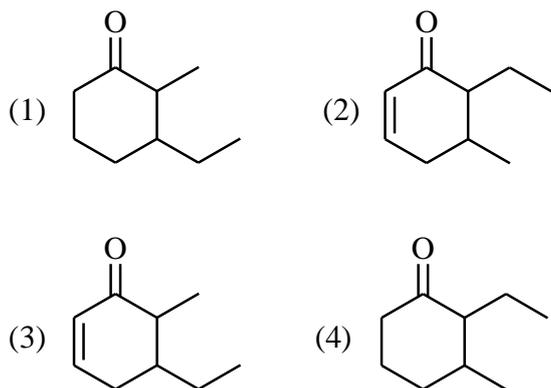


106. For the following compounds, the incorrect statement with respect to nucleophilic substitution reaction is

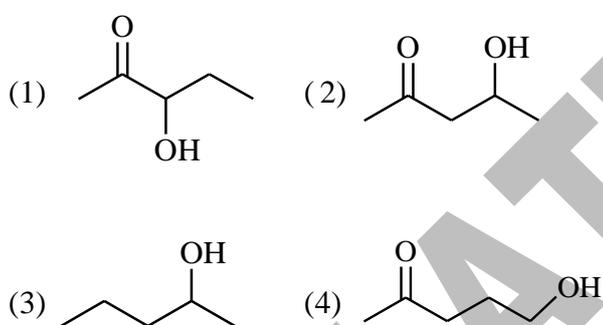


- (1) I & II follow SN^2 mechanism
- (2) Compound IV undergoes inversion of configuration
- (3) The order of reactivity for I, III and IV is $\text{IV} > \text{I} > \text{III}$
- (4) I and III follow SN_1 mechanism

107. Structure of the compound whose IUPAC name is 5-ethyl-6-methylcyclohex-2-en-1-one is



108. Which of the following will be dehydrated most readily in alkaline medium?



109. A compound with molecular formula C_4H_4O has all the four carbon atoms & the oxygen atom in the ring. It also has two double bonds. The compound is

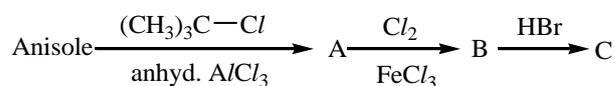
- (1) homocyclic and aromatic
- (2) heterocyclic and aromatic
- (3) homocyclic but not aromatic
- (4) heterocyclic but not aromatic

110. Which one of the following is a technique most suitable for purification of cyclohexanone from a mixture containing benzoic acid isoamyl alcohol, cyclohexane and cyclohexanone?

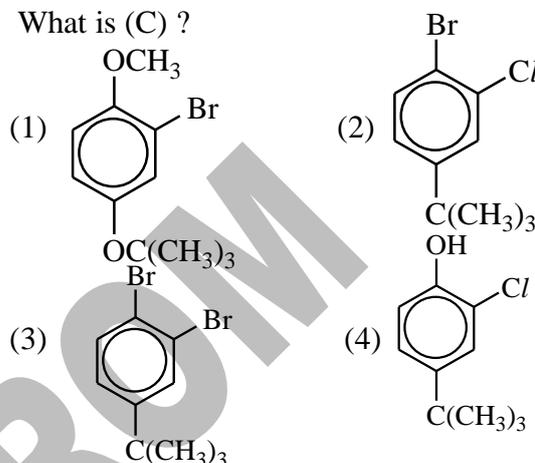
- (1) Crystallization

- (2) Sublimation
- (3) IR spectroscopy
- (4) Gas chromatography

111.



What is (C) ?



112. In the reaction $4\text{NH}_3\text{g} + 5\text{O}_2\text{g} \rightarrow 4\text{NOg} + 6\text{H}_2\text{O}(\text{l})$ when 1 mole of NH_3 and 1 mole of O_2 are made to react to completion.

- (1) 1 mole of H_2O is produced
- (2) 1 mole of NO will be produced
- (3) All the oxygen will be consumed
- (4) All the ammonia will be consumed.

113. In which of the following options the order of arrangement does not agree

with the variation of property indicated against it ?

- (1) $\text{I} < \text{Br} < \text{Cl} < \text{F}$ (increasing electron gain enthalpy)
- (2) $\text{Li} < \text{Na} < \text{K} < \text{Rb}$ (increasing metallic radius)
- (3) $\text{Al}^{+3} < \text{Mg}^{+2} < \text{Na}^{+} < \text{F}^{-}$ (increasing ionic size)

(4) $B < C < O < N$ (increasing first ionisation enthalpy)

114. In which of the following pairs, the two species are iso-structure?

(1) SO_3^{2-} and NO_3^-

(2) BF_3 and NF_3

(3) BrO_3^- and XeO_3

(4) SF_4 and XeF_4

115. If the standard electrode potential of $\text{Cu}^{2+}/\text{Cu} = 0.34 \text{ V}$, what is the electrode potential of 0.01M concentration of Cu^{2+} ?

(1) 0.399 V (2) 0.281 V

(3) 0.222 V (4) 0.176 V

116. If the unit cell of a mineral has cubic close packed array of oxygen atoms with (m) fraction of octahedral holes occupied by aluminium ions & n fraction of tetrahedral holes occupied by magnesium ions, m & n are

(1) $\frac{1}{2}$, $\frac{1}{8}$ (2) 1, $\frac{1}{4}$

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

117. $\text{A}_2(\text{g}) + \text{B}_2(\text{g}) \rightleftharpoons 2 \text{AB}(\text{g})$: At equilibrium, the concentration of $\text{A}_2 = 3 \times 10^{-3}(\text{M})$,

$\text{B}_2 = 4.2 \times 10^{-3}(\text{M})$, $\text{AB} = 2.8 \times 10^{-3}(\text{M})$

If the reaction takes place in a sealed vessel at 527°C , the value of K_c will be

(1) 2.0 (2) 1.9

(3) 0.62 (4) 4.5

118. The coagulation of 10 ml of a colloidal sol of gold is completely prevented by addition of 0.25 g of a substance X to it before adding 1 ml of 10% NaCl solution. The gold number of X is

(1) 25 (2) 0.25

(3) 2.5 (4) 250

119. How many moles of Al reacts with 3 moles of NaNO_3 in basic medium?

(1) $\frac{8}{3}$

(2) $\frac{3}{8}$

(3) 3

(4) 8

120. In cryoscopic method, molecular weight of NaCl is 31.5, the rate of dissociation of NaCl is

(1) 75%

(2) 45%

(3) 85%

(4) 65%

121. Molarity of liquid HCl with be, if density of solution is 1.17 g/cc

(1) 36.5

(2) 32.05

(3) 18.25

(4) 42.10

122. For a reaction between A and B the order with respect to A is 2 and the order with respect to B is 3. The concentrations of both A and B are doubled; the rate will increase by a factor

(1) 10

(2) 12

(3) 16

(4) 32

123. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

(1) The ΔG_f^0 of the sulphide is greater than those for CS_2 & H_2S

(2) The " G_f^0 " is negative for roasting of sulphide ore to oxide

(3) Roasting of the Sulphide to the oxide is thermodynamically feasible

(4) Carbon & hydrogen are suitable reducing agents for metal sulphide

124. Which of the following complex ion is not expected to absorb visible light?

(1) $[\text{Ti}(\text{en})_2(\text{NH}_3)_2]^{4+}$

(2) $[\text{Cr}(\text{NH}_3)_6]^{3+}$

(3) $[\text{Zn}(\text{NH}_3)_6]^{2+}$

(4) $[\text{Sc}(\text{H}_2\text{O})_3(\text{NH}_3)_3]^{3+}$

125. Fructose reduces tollen's reagent due to

(1) enolisation of fructose followed by conversion to glucose by the base present in Tollen's reagent

(2) asymmetric carbons

(3) Primary alcoholic group

(4) Secondary alcoholic group

126. Which polymer is used for the preparation of bullet proof window?

(1) Thokol

(2) Dextron

(3) Lexan

(4) Nylon 2, 6

127. Which one of the following can possibly be used as analgesic without causing addiction and mood modification?

(1) Diazepam

(2) Morphine

(3) N - Acetyl - p - aninoplenol

(4) Tetrahydrocannabinol

128. HCl is not used to make the solution acidic in oxidation reaction of KMnO_4 because

(1) KMnO_4 starts to act as a reducing agent

(2) KMnO_4 becomes a weaker oxidising agent

(3) KMnO_4 oxidise HCl to Cl_2 , which is also an oxidising agent

(4) KMnO_4 and HCl both act as oxidising agent

129. Identify the incorrect statement regarding the XeO_4 molecule

(1) XeO_4 molecule is tetrahedral

(2) XeO_4 molecule is square planar

(3) There are four $p\pi - d\pi$ bonds

(4) There are four $sp^3 - p, \delta$ bonds

130. The composition of eu-chlorine is

(1) $\text{Cl}_2 + \text{SO}_2$

(2) $\text{C}_2 + \text{ClO}_2$

(3) $\text{HClO}_3 + \text{Cl}_2$

(4) $\text{Br}_2 + \text{Cl}_2$

131. The total number of ions produced when Mohr's salt is dissolved in water is

(1) 4

(2) 5

(3) 3

(3) 8

132. The correct statement regarding defects in crystalline solid is

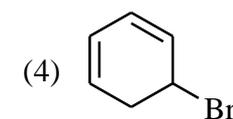
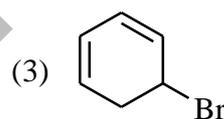
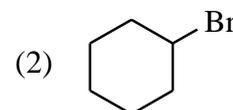
(1) Frenkel defects decrease the density of crystalline solids

(2) Frenkel defect is a dislocation defect

(3) Frenkel defect is found in halides of alkaline metals

(4) Schottky defects have no effect on the density of crystalline solids

133. Which of the following undergo fastest debromination ?



134. Green chemistry means such reaction which

(1) Produce colour during reactions

(2) Reduce the use & production of hazardous chemicals

(3) Are related to depletion ozone layer

(4) Study the reactions in plants

135. What is the product formed when concentrated H_2SO_4 reacts with nitric oxide & nitrogen dioxide mixture

(1) HNO_3

(2) NOHSO_4

(3) $\text{HNO}_3 + \text{N}_2\text{O}_5$

(4) $\text{SO}_3 + \text{N}_2\text{O}_4$

Subject: PHYSICS

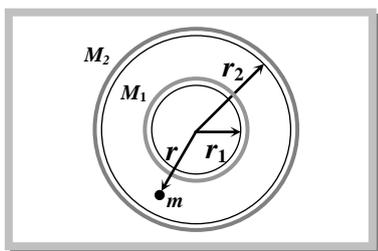
136. Two particles of mass M and m are moving in a circle of radii R and r . If their time-periods are same, what will be the ratio of their linear velocities?

- (1) $MR : mr$ (2) $M : m$
 (3) $R : r$ (4) $1 : 1$.

137. \vec{A} and \vec{B} vectors are given by $\vec{A} = 2\hat{i} + 3\hat{j}$ and $\vec{B} = \hat{i} + \hat{j}$. The magnitude of the component (projection) of \vec{A} on \vec{B} is

- (1) $\frac{5}{\sqrt{2}}$ (2) $\frac{3}{\sqrt{2}}$
 (3) $\frac{7}{\sqrt{2}}$ (4) $\frac{1}{\sqrt{2}}$

138. Two concentric shells of mass M_1 and M_2 are having radii r_1 and r_2 . Which of the following is the correct expression for the gravitational field on a mass m .



- (1) $I = \frac{G(M_1 + M_2)}{r^2}$ for $r < r_1$
 (2) $I = \frac{G(M_1 + M_2)}{r^2}$ for $r < r_2$
 (3) $I = G \frac{M_2}{r^2}$ for $r_1 < r < r_2$
 (4) $I = \frac{GM_1}{r^2}$ for $r_1 < r < r_2$

139. A wheel with 30 metallic spokes each of 0.7 m long is rotated with a speed of 120 rpm, in a plane normal to the horizontal component of earth's magnetic field H_E at a place. If $H_E = 0.8$ G at the place, what is the induced emf between

the axle and the rim of the wheel? (Given $1 \text{ G} = 10^{-4} \text{ T}$)

- (1) $2.46 \times 10^{-4} \text{ V}$ (2) $6.28 \times 10^{-4} \text{ V}$
 (3) $5.76 \times 10^{-5} \text{ V}$ (4) $4.92 \times 10^{-4} \text{ V}$

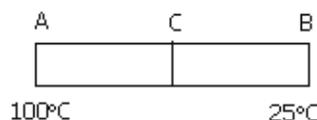
140. A capacitor of capacity C and reactance X if capacitance and frequency become double then reactance will be

- (1) $4X$ (2) $X/2$
 (3) $X / 4$ (4) $2X$

141. A horizontal disc is rotating about a vertical axis passing through its centre. If an insect moves from centre to rim then the angular momentum of the system

- (1) First decrease and then increase
 (2) Remains Constant
 (3) Decreases
 (4) Increases

142. Two identical rods AC and CB made of two different metals having thermal conductivities in the ratio 2: 3 are kept in contact with each other at the end C as shown in the figure. A is at 100°C and B is at 25°C . Then the junction C is at



- (1) 50°C (2) 75°C
 (3) 60°C (4) 55°C

143. Two solenoids having lengths L and $2L$ and the number of loops N and $4N$, both have the same current, then the ratio of the magnetic field will be

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

144. A moving charges produces

- (1) electric field only
 (2) magnetic field only
 (3) both of them

(4) undefined

145. A motor car blowing a horn of frequency 124 vibration/sec moves with a velocity 72 km/hr towards a tall wall. The frequency of the reflected sound heard by the driver will be (velocity of sound in air is 330 m/s)

- (1) 109 vibration/sec
- (2) 132 vibration/sec
- (3) 140 vibration/sec
- (4) 248 vibration/sec

146. 22 gm of CO_2 at $27^\circ C$ is mixed with 16 gm of O_2 at $37^\circ C$. The temperature of the mixture is

- (1) $32^\circ C$
- (2) $27^\circ C$
- (3) $37^\circ C$
- (4) $30.5^\circ C$

147. Light of wavelength $\lambda = 5000 \text{ \AA}$ falls normally on a narrow slit. A screen placed at a distance of 1 m from the slit and perpendicular to the direction of light. The first minima of the diffraction pattern are situated at 5 mm from the centre of central maximum. The width of the slit is

- (1) 0.1 mm
- (2) 1.0 mm
- (3) 0.5 mm
- (4) 0.2 mm

148. Two unlike charges of the same magnitude Q are placed at a distance d. The intensity of the electric field at the middle point of the line joining the two charges is

- (1) zero
- (2) $\frac{8Q}{4\pi\epsilon_0 d^2}$
- (3) $\frac{6Q}{4\pi\epsilon_0 d^2}$
- (4) $\frac{4Q}{4\pi\epsilon_0 d^2}$

149. A block of ice floats on a liquid of density 1.2 in a beaker then level of liquid when ice completely melts

- (1) Remains same
- (2) rises

(3) Lowers (4) (1), (2) or (3)

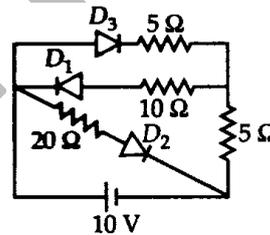
150. A weight of 5 kg is required to produce the fundamental frequency of a sonometer wire. What weight is required to produce its octave?

- (1) 10 kg wt
- (2) 20 kg wt
- (3) 30 kg wt
- (4) 40 kg wt

151. Two identical flutes produce fundamental notes of frequency 300 Hz at $27^\circ C$. If the temperature of air in one flute is increased to $31^\circ C$, the number of beats heard per second will be

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

152. In the given circuit the current through the battery is (assume all diodes are ideal)



- (1) 0.5A
- (2) 1 A
- (3) 1.5 A
- (4) 2 A

153. When a potential difference is applied across electric elements, the current passing through each element given in the options. Which one is incorrect

- (1) an insulator at 0 K is zero
- (2) a semiconductor at 0 K is zero
- (3) a metal at 0 K is finite
- (4) a p-n diode at 300 K is finite, if it is reverse biased

154. A spherical black body with radius of 12 cm radiates 450 W powers at 500 K. If the

radius were halved and the temperature doubled, the power radiated in watt would be

- (1) 225 W (2) 450 W
(3) 900 W (4) 1800 W

155. Average density of the earth

- (1) does not depend on g
(2) is a complex function of g
(3) is directly proportional to g
(4) is inversely proportional g

156. In a common emitter amplifier circuit using n-p-n transistor, the phase difference between the input and the output voltage will be

- (1) 45° (2) 90°
(3) 135° (4) 180°

157. Two waves being produced by two sources s_1 and s_2 . Both sources have zero phase difference and have wavelength λ . The destructive interference of both the waves will occur of point P if $(S_1P - S_2P)$ has the value

- (1) 5λ (2) $\frac{3}{4}\lambda$
(3) 2λ (4) $\frac{11}{2}\lambda$

158. Three rods each of length L and mass M are placed along X , Y and Z -axes in such a way that one end of each of the rod is at the origin. The moment of inertia of this system about Z axis is

- (1) $\frac{2ML^2}{3}$ (2) $\frac{4ML^2}{3}$
(3) $\frac{5ML^2}{3}$ (4) $\frac{ML^2}{3}$

159. A steel ball of mass 1kg is moving with a velocity 1 m/s . Then its de-Broglie wave length is equal to

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

160. The wavelength of light in two liquids 'x' and 'y' is 3500 \AA and 7000 \AA , then the critical angle of x relative to y will be

- (1) 60° (2) 45°
(3) 30° (4) 15°

161. . In stationary waves, antinodes are the points where there is

- 1) Minimum displacement and minimum pressure change
2) Minimum displacement and maximum pressure change
3) Maximum displacement and maximum pressure change
4) Maximum displacement and minimum pressure change

162. At room temperature, the *rms* speed of the molecules of certain diatomic gas is found to be 1930 m/s . The gas is

- (1) H_2 (2) F_2
(3) O_2 (4) Cl_2

163. A body A starts from rest with an acceleration a_1 . After 2 seconds, another body B starts from rest with an acceleration a_2 . If they travel equal distances in the 5th second, after the start of A, then the ratio $a_1 : a_2$

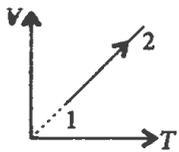
is equal to

- (1) 5: 9 (2) 5: 7
(3) 9: 5 (4) 9: 7

164. The work function of a substance is 4.0 eV . The longest wavelength of light that can cause photoelectron emission from this substance is approximately

- (1) 540 nm (2) 400 nm
 (3) 310 nm (4) 220 nm

165. An ideal gas undergoes the process $1 \rightarrow 2$ as shown in figure. The heat supplied and work done in the process are ΔQ and ΔW respectively. The ratio $\Delta Q : \Delta W$ is



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

166. In an experiment to measure the internal resistance of a cell by potentiometer, it is found that the balance point is at a length of 2 m when the cell is shunted by a 5Ω resistance; and is at a length of 3 m when the cell is shunted by a 10Ω resistance. The internal resistance of the cell is, then

- (1) 1.5Ω (2) 10Ω
 (3) 15Ω (4) 1Ω

167. The magnifying power of an astronomical telescope is 8 and the distance between the two lenses is 54 cm . The focal length of eye lens and objective lens will be respectively

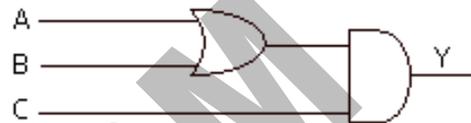
- (1) 6 cm and 48 cm
 (2) 48 cm and 6 cm
 (3) 8 cm and 64 cm
 (4) 64 cm and 8 cm

168. A cubical block of steel of each side equal to L is floating on mercury in a vessel. The densities of

steel and mercury are ρ_s and ρ_m respectively. The height of the block above the mercury level is given by

- (1) $L \left(1 + \frac{\rho_s}{\rho_m} \right)$ (2) $L \left(1 - \frac{\rho_s}{\rho_m} \right)$
 (3) $L \left(1 + \frac{\rho_m}{\rho_s} \right)$ (4) $L \left(1 - \frac{\rho_m}{\rho_s} \right)$

169. To get an output $y = 1$ from the circuit shown, the inputs A, B and C must be respectively



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

170. If mass energy equivalence is taken into account, when water is cooled to form ice, the mass of water should

- (1) Increase
 (2) Remain unchanged
 (3) Decrease
 (4) First increase then decrease

171. A projectile is projected with velocity $k v_e$ in vertically upward direction from the ground into the space. (v_e is escape velocity and $k < 1$). If air resistance is considered to be negligible then the maximum height from the centre of earth to which it can go, will be ($R =$ radius of earth)

- (1) $\frac{R}{k^2 + 1}$ (2) $\frac{R}{k^2 - 1}$
 (3) $\frac{R}{1 - k^2}$ (4) $\frac{R}{k + 1}$

172. The ratio of the wavelengths for $2 \rightarrow 1$ transition in Li^{++} , He^+ and H is

- (1) 1: 2: 3 (2) 1: 4: 9
 (3) 4: 9: 36 (4) 3: 2: 1

173. Under which of the following conditions will a convex mirror of focal length f produce an image that is erect, diminished and virtual

- (1) Only when $2f > u > f$
 (2) Only when $u = f$
 (3) Only when $u < f$
 (4) Always

174. An astronomical telescope in normal adjustment receives light from a distant source S . The tube length is now decreased slightly

- (1) A virtual image of S will be formed at a finite distance
 (2) No image will be formed
 (3) A small, real image of S will be formed behind the eye-piece, close to it
 (4) A large, real image of S will be formed behind the eye-piece, far away from it

175. If the radius of a soap bubble is four times that of another, then the ratio of their excess pressures will be

- (1) 1: 4 (2) 4: 1
 (3) 16: 1 (4) 1: 16

176. The length, breadth and thickness of a block are measured as 125.5 cm , 5.0 cm and 0.32 cm respectively. Which one of the following measurements is most accurate?

- (1) Length (2) Breadth
 (3) Thickness (4) Height

177. A small block slides down from the top of hemisphere of radius R (assumed that no friction between the block and hemisphere). At what height h the block will lose contact with the surface of the sphere?

- (1) $\frac{2R}{3}$ (2) $\frac{R}{3}$

- (3) $\frac{R}{4}$ (4) $\frac{R}{5}$

178. A spherical drop of capacitance $1 \mu \text{ F}$ is broken into eight drops of equal radius. Then, the capacitance of each small drop is

- (1) $\frac{1}{8} \mu \text{ F}$ (2) $8 \mu \text{ F}$
 (3) $\frac{1}{2} \mu \text{ F}$ (4) $\frac{1}{4} \mu \text{ F}$

179. A turn of radius 20 m is banked for the vehicle going at a speed of 36 kmhr^{-1} . If the coefficient of static friction between the road and the tyre is 0.4 , what is the possible speed of a vehicle so that it does not skid up along banked road?

- (1) 10 m/s (2) 15 m/s
 (2) 20 m/s (4) 5 m/s

180. The time taken by a particle executing simple harmonic motion of time period T to move from the mean position to half the maximum displacement is

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

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