M.Sc. im Forensic Science

Code No (472)

Set No. 1

Question Booklet No.   00700

17P/302/23(i)

INSTRUCTIONS TO CANDIDATES

198

17P/302/23(i)

•12८

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M.Sc. im Forensic Science Code No (472)

2017

17P/302/23(1)

No. of Questions : 240

Time : 2 Hours

Full Marks : 360

Note : (1) Attempt as many questions as you can. Each question carries 3 (Three) marks. *One mark will be deducted for each incorrect answer.* Zero mark will be awarded for each unattempted question.

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

(3) This question paper contains two Sections, viz : Section-A and Section-B. Details of Section-A and Section-B are as follows :

(a) Section-A contains 60 questions from General Secinces and 20 questions of General Nature.

(b) Section-B contains four sub-sections namely : Biology, Chemistry, Mathematics and Physics with 40 questions in each. The candidate has to select only one of the four sub-sections of Section-B.

SECTION - A

01. Forensic Science is the application of science to :

(1) those criminal laws that are enforced by police agencies

(2) those civil laws that are enforced by police agencies

(3) those religious laws that are enforced by police agencies

(4) those criminal and civil laws that are enforced by police agencies

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P.T.O.

02. Agglutination describes :
    (1) the separation of red blood cells by the action of an antibody
    (2) the clumping together of red blood cells by the action of an antibody
    (3) the non-clumping of red blood cells by the action of the antibody
    (4) the dissolution of red blood cells by the action of the antibody

03. Y-chromosome is :
    (1) the male sex harmones
    (2) the female sex harmones
    (3) the male sex choromosome
    (4) the female sex chromosome

04. The power of a lens is measured in :
    (1) Diopters   (2) Aeon
    (3) Lumen   (4) Candela

05. Albert Einstein was awarded Nobel Prize for his path-breaking research & formulation of the :
    (1) Theory of Relativity
    (2) Law of Photo-electric Effect
    (3) Principle of Wave Particle Duality
    (4) Theory of Critical Opalescence

06. L.P.G. is a hydrocarbon consisting of a mixture of :
    (1) Methane and Butane   (2) Propane and Butane
    (3) Ethane and Propane   (4) Ethane and Butane

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07. "Pencillin" which is used as an antibiotic, is obtained from :
   (1) Bacteria
   (2) Fungi
   (3) Algae
   (4) Lichens

08. "Amalgam" is term for an alloy of a metal with :
   (1) Copper
   (2) Mercury
   (3) Lead
   (4) Aluminium

09. News websites deliver customized 'jeeds' of content to their readers via RSS, which stands for :
   (1) Really Simple Syndication
   (2) Really Social Syndication
   (3) Registered Subscriber Syndication
   (4) Reclly Simple Synchronisation

10. Pest - resistant cotton commonly known as 'Bt-Cotton' is genetically engineered by inserting a gene from a :
   (1) Bacterium
   (2) Virus
   (3) Micrpalgae
   (4) Protist

11. Brass gets discoloured in air because of the presence of which of the following gases in air :
   (1) Oxygen
   (2) Hydrogensulphide
   (3) Carbon dioxide
   (4) Nitrogen

12. 'Anemophily' is pollination by :
   (1) Birds
   (2) Wind
   (3) Ants
   (4) Bats

13. Which of the following is a non metal that remains liquid at room temperahere ?
   (1) Phosphorus
   (2) Bromine
   (3) Chlorine
   (4) Helium

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14. Chlorophyll is a naturally ocuring chelate compound in which entral metal is :
    (1) Copper
    (2) Magnesium
    (3) Iron
    (4) Calcium

15. Which of the following is used in pencils ?
    (1) Grapthite
    (2) Silicon
    (3) Charcoal
    (4) Phosphorus

16. Which of the following substances under go 'Sublimation' on heating ?

    (A) Iodine (B) Napthalene (C) Camphor
    (1) A and B
    (2) A and C
    (3) B and C
    (4) All of them

17. Consider the following statements :

    A.   Radon is the heaviest gas

    B.   Astatine is the rarest element of the earth

    C.   Graphite which is a non-metal is also an electrical con ductor.

          Which of the following Statementl(s) is/are correct ?
    (1) Only B
    (2) A & B
    (3) B & C
    (4) A, B & C

18. Which of the following is used as a moderator in nuclear reacter ?
    (1) Thorium
    (2) Graphite
    (3) Radium
    (4) Ordinary water

19. "Principle of Exchange" lies on the fact that :

    (1) a mutual exchange of traces takes place between the criminal, the victim and the objects involved in the crime

    (2) an unilateral exchange of traces takes place between the criminal, the victim and the objects involved in the crime

    (3) an exchange of traces takes place between the crime spot and the criminel

    (4) no exchange of traces take place between the crime spot and the victim

20. 'Entomology' is study of :

    (1) trees
    (2) bugs
    (3) fertilizers
    (4) animal

21. Misappropriation, negligences cheating, bulidging collapose, industrial road, train and air accidents come under :

    (1) Non-forensic maintainenace division
    (2) Forensic engineering division
    (3) Non-forensic physical division
    (4) Forensic physics divison

22. Polygraph is a :

    (1) a pictorial information of human
    (2) a non-pictorial information of human
    (3) a brain mapping
    (4) a lie-detectors

23. DNA is found an everybody. Which of the following body materials cannot be used to isolate it ?

    (1) Semen
    (2) Hair
    (3) bone
    (4) Vicera

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24. Abraision means :
    (1) loss and damages of deep layer of body wound
    (2) loss and damages of middle layer of body wound
    (3) loss and damages of deep epithelial layer of skin
    (4) loss and damages of superficial epithetial layer of skin

25. Black powder is a mixture of :
    (1) potassium nitrate, sulphur and charcoal
    (2) potassium citrate, sulphure and charcoal
    (3) potassium bromate, sulphuric acid and graphite
    (4) potassium chloride, hydrochloric acid and graphite

26. CD-RW is :
    (1) A compact disc to which data can not be written and stored
    (2) A compact disc to which data can be written and erased
    (3) A compact disc to which data can be recorded and stored
    (4) A compact disc to which data cannot be transferred

27. 'Dactyloscopy' is a science :
    (1) Dealing with fingerprint   (2) Dealing with DNA
    (3) Dealing with footprint   (4) Dealing with documents

28. Decibel is the unit of :
    (1) Speed of light   (2) Radio wave frequency
    (3) Intensity of sound   (4) Intensity of heat

29. Fanthom is the unit of :
    (1) Sound   (2) Depth
    (3) Frequency   (4) Distance

30. Which prefix is often used with scientific terms to indicate that something is the same, equal or constant ?
   - (1) Iso
   - (2) Mega
   - (3) Meta
   - (4) Quasi

31. The study of phenomenon at a very low temperature is called :
   - (1) Heat transfer
   - (2) Morphology
   - (3) Crystallography
   - (4) Cryogenics

32. What percent of fire-related deaths are due to smokeinhalation rather than burns ?
   - (I) 10%
   - (2) 50%
   - (3) 80%
   - (4) 99%

33. Pollination by birds is called :
   - (1) Autogamy
   - (2) Orthinophilly
   - (3) Entomophilly
   - (4) Anemophilly

34. The per capita birth rate of a population is known as its :
   - (1) Mortality
   - (2) Natality
   - (3) Population density
   - (4) Carrying capacity

35. Which of the following is primarily composed of calcium carbonate ?
   - (1) Fish scales
   - (2) Shark teeth
   - (3) Oystershells
   - (4) Whale bones

36. Water flows through a horizontal pipe at a constant volumetric rate. At a location where the crosssectional area decreases, the velocity of the fluid :
   - (1) Increases
   - (2) Decreases
   - (3) Stays the sume
   - (4) Reduces to half

P.T.O.

37. The most serious environmental pollution from a nuclear reactor is :

(1) Radioactivity
(2) Particulate formulation
(3) Thermal pollution
(4) Noise pollution

38. The process by which a substance absorbs moisture upon exposure to the atmosphere is called ;

(1) Efflorescence
(2) Deliquescence
(3) Dehydrogenation
(4) Desalination

39. A temperature of 295 K is equivalent to approximately :

(1) 0 degrees Fahrenheit
(2) 32 degrees Fahrenheit
(3) 72 degrees Fahrenheit
(4) 97 degrees Fahrenheit

40. The statve of Liberty is green because of :

(1) Green stone
(2) Oxidised brass
(3) Steel painted green
(4) Oxidised copper

41. One metal dissolved in another is called :

(1) an alloy
(2) an assay
(3) a mineral
(4) a ceramic

42. Which of the following contains carbohydrates the most ?

(1) Barley
(2) Maize
(3) Wheat
(4) Rice

43. Alcoholic fermentation is characteristic of :

(1) Virus
(2) Algae
(3) Yeasts
(4) Bacteria

44. Which of the following substance is produced during photosynthesis ?

(1) Fat

(2) Carbohydrate

(3) Amino Acid

(4) Protein

45. Two objects that lose the same weight in water must have the same :

(1) Weight in air

(2) Weight in water

(3) Density

(4) Volume

46. Deficiency of which vitamin affects the ability to see in dim light ?

(1) A

(2) C

(3) D

(4) B_{12}

47. Which of the following is a contagious disease ?

(1) Small Pox

(2) Typhoid

(3) Cholera

(4) Beri-Beri

48. The substance that hardens when mixed with water is :

(1) Red "Lead

(2) Gypsum Salt

(3) Epson Salt

(4) Plaster of Paris

49. The heart of human-being :

(1) Rests while you sleep

(2) Never Rests

(3) Rests between beats

(4) Rests during period of stress

50. When a soap film on water is seen in day time, it shows beautiful colours. This phenomenon is due to :

(1) Diffraction

(2) Refraction

(3) Polarisation

(4) Interference

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51. By fixation of nitrogen is meant :
    (1) Manufacture of nitrogen
    (2) Liquefaction of nitrogen
    (3) Conversion of nitrogen into nitric acid
    (4) Conversion of atmospheric nitrogen into useful compounds

52. Atoms of the same element i.e. having the same atomic number that differs in atomic weight, are called :
    (1) Isotopes   (2) Isomers
    (3) Isobars   (4) Isohytes

53. Joule is the unit of :
    (1) Temperature   (2) Energy
    (3) Heat   (4) Pressure

54. How many Dynes are there in one gram weight ?
    (1) 900   (2) 375   (3) 981   (4) 250

55. Which substance is mixed to stiffer rubber ?
    (1) Sulphur   (2) Iron
    (3) Calcium   (4) Magnesium

56. Twinkling of stars is due to the effect of ....:
    (1) Refraction of light   (2) Reflection of atmosphere
    (3) Refraction of atmosphere   (4) Total Internal Reflection

57. Which type of mirror is used while shaving ?
    (1) Concave mirror   (2) Convex mirror
    (3) Plane mirror   (4) No specific mirror

58. The process of formation of vapour from solid camphor is called .... :
    (1) Freezing   (2) Evaporation
    (3) Sublimation   (4) Condensation

59. Atomes are composed of :

    (1) electrons and protons   (2) electrons only

    (3) protons only   (4) eletrons and nuclei

60. Epoxy resins are used as :

    (1) detergents   (2) insecticides

    (3) adhesives   (4) moth repellents

61. Find the numbers of triangles in the given figure :
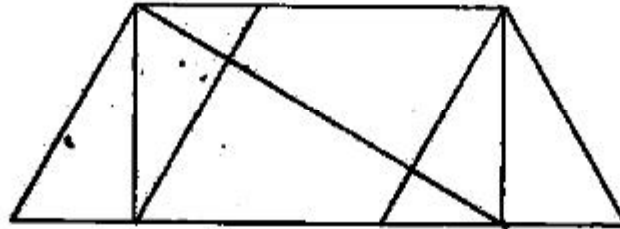
    (1) 8   (2) 10   (3) 12   (4) 14

62. Look at this series : 7, 10, 8, 11, 9, 12, ... what number should come next ?

    (1) 7   (2) 10   (3) 12   (4) 15

63. Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ranit's age ?

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

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

64. Chose the figure which is different from the result :
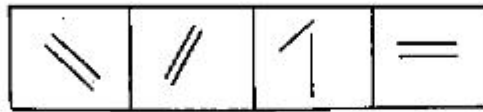
    (A)   (B)   (C)   (D)

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

65. Select a suitable figures from the Answer figure, that would replace the question mark :
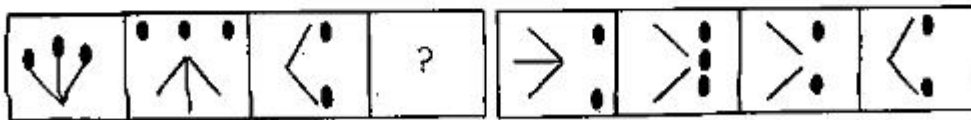
 (1)   (2)   (3)   (4)   (A)   (B)   (C)   (D)

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

66. Based on the following statements, which is the Correct conclusion drawn ?

Only gentlemen can become members of the club are officers, Some of the officers have been invited for dinner :

(1) All the members of the club have been invited for dinner

(2) Some of the officers are not gentlemen

(3) All gentlemen are members of the club

(4) Only gentlemen have been invited for dinner

67. If A is soln of Q, Q and Y are sisters, Z is the mother of Y, P is the son of Z, then which of the following statements is correct ?

(1) P is the maternal uncle of A

(2) P and Y are sisters .

(3) A and P are cousins

(4) None of the above

68. Marathon is to race as hibernation is to :

(1) Winter   (2) Bear   (3) Dream   (4) Sleep

69. A train running at the speed of 60 Km./hr. crosses a pole in 9 seconds. What is the lenght of the train ?

(1) 120 metres   (2) 180 metres

(3) 324 metres   (4) 150 metres

70. In this series, you will be looking at both the letter pattern and the number pattern. Fill in blank in the midde of the series :

SCD, TEF, UGH, ..., WKL

(1) CMN   (2) UJI   (3) VIJ   (4) IJT

71. Speed of the boat in still water is 9 Km./hr. It goes 12 Km. down stream and come back to the starting point in three hours. What is the speed of water in the stream ?

(1) 3.5 Km./hr.   (2) 3 Km./hr.

(3) 5 Km./hr.   (4) 5.5 Km./hr.

72. Choose the alternative which is closely resembles the mirror image of the given combination ?

ANS43Q12

(a) AИƧ4ꞘOⱵ   (b) ƧⱵOⱵƧИA

(b) Ƨ4АƧ4OƧⱵ   (d) ⱵƧOⱵƧ4ИƧ

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

73. Yard is to inch as quart is to :

(1) Gallon   (2) Ounce   (3) Milk   (4) Liquid

74. Each problem consists of three statements. Based on the first two statements, the third statement may be true, false or uncertain:
(a) Tanya is older than Eric
(b) Cliff is older than Tanya
(c) Eric is older than Cliff
   If first two statements are true, the third statement is :
   (1) True   (2) False
   (3) Uncertain   (4) Can't say

75. Choose the word which is the exact OPPOSITE of the given word "ENORMOUS"?
   (1) Soft   (2) Average   (3) Tiny   (4) Weak

76. Three times the first of three consecutive odd integers is 3 more than twice the third. The third integer is :
   (1) 9   (2) 11   (3) 13   (4) 15

77. If one-third of one-fourth of a number is 15, then three-tenth of that number is :
   (1) 35   (2) 36   (3) 45   (4) 54

78. A right triangle with sides 3cm, 4cm & 5cm is rotated the side of 3cm to form a cone. The volume of the cone so formed is :
   (1) $12 \pi\, cm^3$ (2) $15 \pi\, cm^3$
   (3) $16 \pi\, cm^3$ (4) $20 \pi\, cm^3$

79. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through :
   (1) 145^0 (2) 150^0 (3) 155^0 (4) 160^0

80. In a four-day period Monday through thursday each of the following temporary office workers worked only one day, each a different day. Ms. Johnson was scheduled to work on Monday, but she traded with Mr. Carter, who was originally scheduled to work on wednesday. Ms. Falk traded with Mr. Kirk, who was originally scheduled to work on thursday. After all the switching was done, who worked on Tuesday ?
   (1) Mr. Carter   (2) Ms. Falk
   (3) Ms. Johnson   (4) Mr. Kirk

SECTION - B

(BIOLOGY)

81. Diatoms belongs to the group :
    (1) Algae
    (2) Fungi
    (3) Lichens
    (4) Cyanobacteria

82. Which of the following plant causes allergy and hay fever :
    (1) *Argemone mexicama*
    (2) *Panthenium hysterophones*
    (3) *Jattropha curcas*
    (4) *Nerium indicum*

83. Caruncle is found in the seeds of :
    (1) *Nerium*
    (2) *Dhatura*
    (3) *Ricinus*
    (4) *Litchi*

84. Reserpene drug is extracted from :
    (1) *Atropa belladona*
    (2) *Ricinus Communis*
    (3) *Rauvoffia Serpentina*
    (4) *Tagetes erecta*

85. Which of the following drug is used for treatment of Pulmonary problems ?
    (1) Nicotine
    (2) Abrin
    (3) Ricin
    (4) Ephedrine

86. Velamen is found in the roots of :
    (1) *Mangroves*
    (2) *Orchids*
    (3) *Cuscuta*
    (4) *Cycas*

87. Perisperm in seeds develop from :
    (1) Nucellus
    (2) Funicle
    (3) Hilum
    (4) Ovary wall

88. Trangenic golden rice is enriched with :
   (1) Glutenin
   (2) Methionine
   (3) Vitamin A
   (4) All the essential amino acids

89. Primary Precersor of I.A.A. is :
   (1) Leucine
   (2) Tryptophan
   (3) Methionine
   (4) Aspartic acid

90. Circinotropouds ovale is found in :
   (1) *Opuntia*
   (2) *Raphanus*
   (3) *Crotalaria*
   (4) *Polygonum*

91. Find the false statement with regards to Asteraceas :
   (1) Epigynous Flower
   (2) Syngenesious authers
   (3) Cypsella fruits
   (4) Axile placentation

92. Coir is obtained from :
   (1) *Cocos nucifera*
   (2) *Crotalaria juncea*
   (3) *Gossypium arboreum*
   (4) *Agave americana*

93. Which ecological pyramid is always upright :
   (1) Pyramid of number
   (2) Pyramid of biomass
   (3) Pyramid of energy
   (4) Pyramid of number and pyramid of biomass

94. Which of the following enzymes is active above 90°C ?
   (1) ATP Synthetase
   (2) Taq Polymerase
   (3) Peroxidase
   (4) Lipase

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95. Incomplete dominance is found in :
    (1) *Solanum*   (2) *Mirabilis*
    (3) *Iberis*   (4) *Pisum*

96. Total numbr of hot spots of biodiversity in India is :
    (1) Two   (2) Four
    (3) Five   (4) Ten

97. First transgenic crop was :
    (1) Tobacco   (2) Brinjal
    (3) Rice   (4) Pea

98. Capsule of fern Eporangium burst at :
    (1) Annulus   (2) Stomium
    (3) Placenta   (4) Romenta

99. Insectivorous plants grow in the soil deficient in :
    (1) Magnesium   (2) Calcium
    (3) Water   (4) Nitrogen

100. Molecular scissor used in genetic engineering is :
    (1) Ligase   (2) Restriction endonucleus
    (3) Catalase   (4) Peroxidase

101. Labyrinthiform organs are found in :
    (1) *Anabas* and work as accessory respiratyory organs
    (2) *Clarias* and help in excretion
    (3) Sharks and form skin covering
    (4) *Labeo rohita* and act as current receptors

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102.In a shark fish, epibranchial arteries :
    (1) carry deoxygenated blood and supply it to gills
    (2) carry deoxygenated blood and supply it to dorsal aorta
    (3) carry oxygenated blood and supply it to gills
    (4) carry oxygenated blood and supply it to dorsal aorta

103.Deltoid ridge and acromion process are present in :
    (1) Femur and Pectoral girdle
    (2) Humerus and Pelvic girdle
    (3) Humerus and Pectoral girdle
    (4) Femur and Pelvic girdle

104.Anterior choroid plexus of brain :
    (1) Secretes cerebro-spinal fluid
    (2) Controls motor activity
    (3) Regulates salt balance in the body
    (4) Coordinates locomotion

105.Which of the following snake will possess broad belly scales, enlarged scales on the middle of back and very large fourth infra-labial scale ?
    (1) Cobra   (2) Krait   (3) Viper   (4) Rat snake

106.Delicate hair like feathers having short calamus, long thread like rachis with few terminal barbs are known as :
    (1) Down feathers   (2) Contour feathers
    (3) Powder down feathers   (4) Filoplume feathers

107.Organ of Jacobson is absent in adult :
    (1) *Columba*   (2) *Sphenodon*
    (3) *Naja*   (4) *Hemidactylus*

108.Animal that shows Unguligrade locomotion is :
    (1) Bear   (2) Dog   (3) Deer   (4) Primates

109. Parental care in *Alytes* is :
  - (1) Shown by male that ties eggs on its back
  - (2) Shown by female by keeping eggs in the mouth
  - (3) Shown by both sexes by keeping eggs in abdominal brood pouch
  - (4) Both parents gaurd eggs one after the other

110. Which of the following animals shows biradial symmetry ?
  - (1) Volvox
  - (2) Sea anemone
  - (3) Hydra
  - (4) Sycon

111. Which one of the following animal is commonly called as 'hook-worm' ?
  - (1) Ascaris lumbricoides
  - (2) Enterobius vermiularis
  - (3) Trichuris trichura
  - (4) Ancylostoma duodenale

112. Which class of mollusca has closed circulatory system ?
  - (1) Pelecypoda
  - (2) Scaphopoda
  - (3) Gastropoda
  - (4) Cephalopoda

113. Pianula is a larval form of :
  - (1) Prtozoans
  - (2) Cindarians
  - (3) Molluscans
  - (4) Nematodes

114. Excretory organ of Limulus is :
  - (1) Malpighian tubules
  - (2) Nephridia
  - (3) Coxal glands
  - (4) Green glands

115. Pseudocoelom is :
  - (1) A body cavity lined with endoderm
  - (2) A body cavity completely lined with mesoderm
  - (3) A body cavity whose inner edge is lined by endoderm while outer edge is lined by mesoderm
  - (4) None of the above

P.T.O.

116. Which of the following is **not** a major factor in the success of the Arthropoda ?

   (1) Highly developed sensory organs

   (2) A chitinous exoskeleton

   (3) Segmentation and appendages

   (4) Open circulatory system

117. Annelids are also called as :

   (1) Flatworms   (2) Thread worms

   (3) Bristle worms   (4) Whipworms

118. $c\,l\,B$ technique in *Drosophila* is used to detect :

   (1) autosomal recessive mutations

   (2) autosomal dominant mutations

   (3) sex linked recessive lethal mutations

   (4) sex linked dominant lethal mutations

119. If a couple, husband having an X-linked dreadly disease and wife homozygous normal, seeks your advice regarding having children, what will be your advice out of the following ?

   (1) The will have 50% chance of having the affected male child

   (2) They can safely go for only female child

   (3) They can safely go for only male child

   (4) They should not plan to have a child

120. Segregation of alleles usually takes place at which phase of cell division ?

   (1) First anaphase of meiosis   (2) Anaphase of mitosis

   (3) Pachytene   (4) Diplotene

SECTION - B

(CHEMISTRY)

121. Compound A and B are :

(A)   (B)
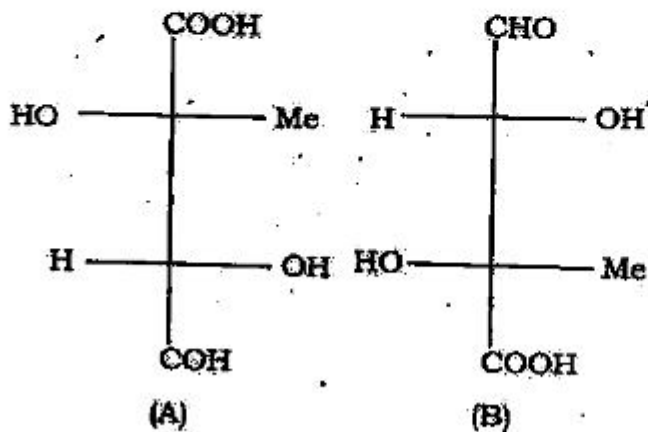
(1) Enantiomers
(2) Epimers
(3) Diastereomers
(4) Identical

122. The IUPAC name of the compond given below is :
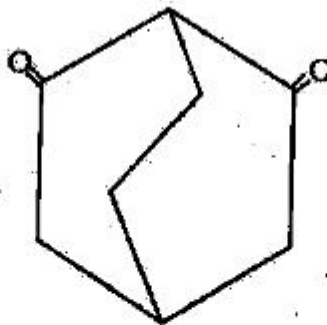
(1) Bicyclo [2,2,0] octa -2,6-diene
(2) Bicyclo [1,1,1] octanone
(3) Bicyclo [2,2,2] - octa -2,5-dione
(4) Bicyclo [2,2,1] - octa -2,5- dione

P.T.O.

123. A suitable reagent combination for carrying out the following conversion is :
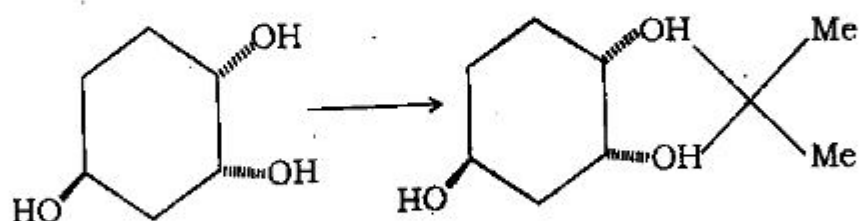
(1) Triethyl orthoacetate and p- toluene sulfonic Acid

(2) 2-methoxypropene and sodium hydroxide

(3) Trimethylorthoacetate and sodium hydroxide

(4) 2- methoxypropene and p-toluene sulfonic Acid

124. The major product (A) in the reaction given below, is :

$$CH_3 - \underset{\overset{|}{\overset{\oplus}{N}(CH_3)_3} \, I^{\ominus}}{CH_2} - CH - CH_3 \xrightarrow[\Delta]{Ag_2O} \underline{A} + N(CH_3)_3$$
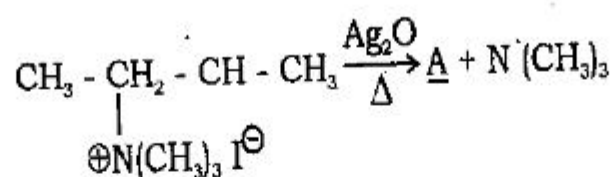
(1) 2- Iodobutane

(2) 1- Butene

(3) cis-2-Butene

(4) trans -2- Butene

125. Benzene ring substituent is deactivating, but O/P - directing :

(1) - N = O

(2) - OCH_3

(3) $-\overset{\overset{\displaystyle O}{\|}}{C} - CH_3$

(4) -NO_2

126. The major product obtained from the mono-bromination of Phenyl benzoate is :

(1)

(2)

(3)

(4)
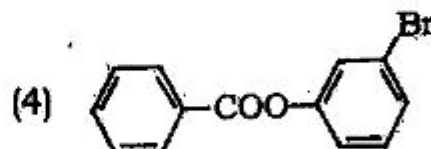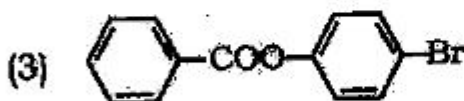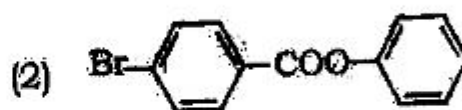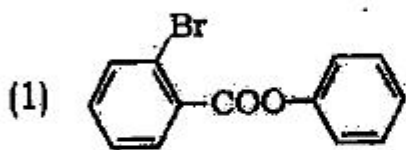
127. In the given reaction,
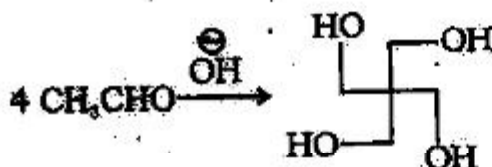
the reaction sequence is :

(1) Two times Aldol reaction followed by Cannizzaro reaction

(2) Two times Aldol reaction followed by Cannizzaro reaction

(3) Cannizzaro reaction followed by Aldol reaction

(4) Simple consecutive Aldol reactions.

128. The two reactions involved in the Robinson Annulation is :

(1) Michael reaction followed by Perkin reaction

(2) Hydroboration reaction followed by oppenauer oxidlation

(3) Diels-Alder reaction followed by Aldol reaction

(4) Michael reaction followed by Aldol reaction

129. The reaction given below involved :
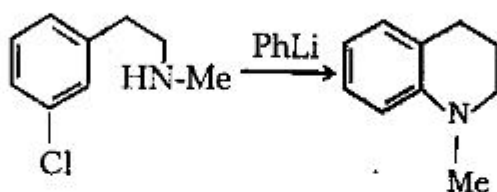
- (1) Benzyne mechanism
- (2) Addition-Elimination mechanism
- (3) Concerted Mechanism
- (4) Free radical mechanism

130. Which of the following compound have the greatest resonance energy :

(1)

(2)

(3)

(4)
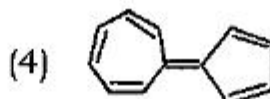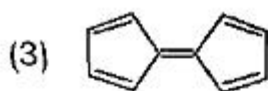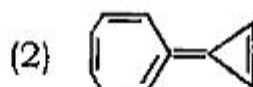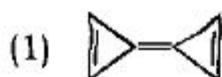
131. How many grams per mililiter of Nacl are contained in a 0.250M solution ?

- (1) 0.143 g/ml
- (2) 0.0146 g/ml
- (3) 0.0014 g/ml
- (4) 1.460 g/ml

132. The criteria for selection of a redox indicator is :

(1) $E < \dfrac{0.0591}{n}$

(2) $E > \dfrac{0.0591}{n}$

(3) $E = \dfrac{0.0591}{n}$

(4) $E = \dfrac{n}{0.0591}$

133. The salt of a weak acid is :

   (1) Neutral   (2) Strong acid

   (3) Strong base   (4) Weak base

134. Which of the following reagents is used for the estimation of selective C-C cleavage ?

   (1) Karl-Fishcer reagent   (2) Chloramine-T

   (3) Potassium Bromate   (4) Periodic acid

135. The concentration of zinc ion is about 1ppm. This can be expressed as meq/L. :

   (1) 3.10×10^{-2} (2) 3.20×10^{-2}

   (3) 3.30×10^{-2} (4) 3.06×10^{-2}

136. A 2.6g sample of plant tissue was analyzed and found to contain 3.6 μg zinc. What is the concentration of zinc in the plant in ppb ?

   (1) 1400 ppb   (2) 1200 ppb

   (3) 1300 ppb   (4) 1000ppb

137. The distribution ratio of weak acid in water is given by :

   (1) $D = \dfrac{K_D}{\dfrac{K_a}{[H^+]}+1}$ (2) $D = \dfrac{K_a}{\dfrac{K_D}{[H^+]}+1}$

   (3) $D < \dfrac{K_D}{\dfrac{K_a}{[H^+]}+1}$ (4) $D > \dfrac{K_D}{\dfrac{K_a}{[H^+]}+1}$

138. The Van Deemter Equation is :

(1) $HETP = A + \dfrac{B}{\bar{\mu}} + C\bar{\mu}$

(2) $HETP = B + \dfrac{A}{\bar{\mu}} + C\bar{\mu}$

(3) $HETP = C + \dfrac{A}{\bar{\mu}} + B\bar{\mu}$

(4) $HETP = A + \dfrac{C}{\bar{\mu}} + B\bar{\mu}$

139. The relation between A and T is :

(1) $A = \log \dfrac{1}{T}$

(2) $A = \log T$

(3) $A = \log\% \, T$

(4) $A = \log 10 \, T$

140. The Ksp of Agcl is 1.0×10^{-10}. The concentrations of Ag+ is :

(1) 1.0×10^{-10}

(2) 1.0×10^{-5}

(3) 1.0×10^{-4}

(4) 1.0×10^{-3}

141. The temperature at which a real gas obeys the ideal gas laws over a wide range of pressure is :

(1) critical temperature

(2) boyle's temperature

(3) inversion temperature

(4) reduced temperature

142. The rise of liquid in a capillary is due to :

(1) viscosity

(2) osmosis

(3) surface tension

(4) diffusion

143. For coagulating Sb_2S_3 colloidal sol, which one of the following will have the lowest coagulation value ?

(1) $AlCl_3$

(2) $BaCl_2$

(3) KCl

(4) $NaCl$

144. For the reaction $2NO(g) + Cl_2(g) \xleftrightarrow{} 2NOCl(g)$

(1) $k_p = k_c \times RT$

(2) $k_p = k_c/RT$

(3) $k_p = k_c \times (RT)^2$

(4) $k_p = k_c/(RT)^2$

145. In a three component system the maximum number of degree of freedom can be :

(1) 4

(2) 3

(3) 2

(4) 1

146. The rate equation for the oxidation of bromide ions by hydrogen peroxide in acid solution :

$2Br^- + H_2O_2 + 2H^+ \rightarrow Br_2 + 2 H_2O$ is $v = k [H_2O_2] [H^+] [Br^-]$

If the concentration of H_2O_2 is increased by a factor of 3, by what factor the rate of consumption of Br^- ions will be increased :

(1) unaffected

(2) 2

(3) 3

(4) 4

147. 2.0 g of a solute X is distributed between 100 ml of water and 5 ml of CCl_4. If the equilibrium amount of X in the aqueous layer is 0.5, the partition coefficient of X between CCl_4 layer and aqueous layer is :

(1) 50

(2) 60

(3) 30

(4) 40

148. The isotope $^{214}_{84}Po$ undergoes one alpha and one beta particle emission sequentially to form an isotope X. The number of neutrons in X would be :

(1) 82

(2) 83

(3) 127

(4) 210

P.T.O.

149. Which of the following statements is **not true** for chemisorption ?
    (1) Its magnitude increases with temperature
    (2) Very high order of heat is evolved in it
    (3) It is an irreversible process
    (4) It involves multi-molecular layer

150. Which of the following crystals will have the highest cohesive energy (or binding energy) ?
    (1) NaCl
    (2) CsCl
    (3) $MgCl_2$
    (4) CaO

151. The name of Alfred Werner is associated with :
    (1) supramolecular chemistry
    (2) coordination chemistry
    (3) heterocyclic chemistry
    (4) homogeneous catalysis

152. Which of the following is a set of linear molecules/ions ?
    (1) CO_2, NCS^- and NO_2^+
    (2) CO_2, NCS^- and NO_2
    (3) NO_2, N_3^- and NCS^-
    (4) ClO_2, CO_2 and NO_2^+

153. Two isomers are known for $Pt(NH_3)_2Cl_2$. Which of the following structures are consistent with this observation ?
    (i) tetrahedral
    (ii) planar
    (iii) trigonal pyramidal
    (1) only (i)
    (2) only (ii)
    (3) (i) and (ii)
    (4) (ii) and (iii)

154. Consider the reaction in which a strong base $M(OH)_3$ is neutralized by a strong acid H_2X. What volume of 2 M base will be equivalent to 1 L of 3M acid ?
    (1) 1 L
    (2) 1.5 L
    (3) 2 L
    (4) 0.7 L

155. Complete the sentence : An octahedral complex, MA_4B_2 ....

    (1) will have two constitutional isomers

    (2) will have two stereoisomers

    (3) can not show isomerism

    (4) will be optically active

156. What is the coordination number of a metal ion situated at the center of a square antiprism of ligand atoms ?

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

157. When ammonium hydroxide is added to an aqueous solution of copper sulphate, the colour of the solution becomes a deeper blue. The reaction taking place is best described as :

    (1) redox   (2) rearrangement

    (3) addition   (4) substitution

158. How may moles of $M_nO_4^-$ will be equivalent to one mole of Fe^{2+} in acid medium ?

    (1) 5 moles   (2) 1/5 moles

    (3) 2 moles   (4) 1/2 moles

159. A coordination complex was obtained in the form of two isomers both of which have octahedral coordination. No additional isomers could be isolated. Which among the following formulas is(are) consistent with this observation ? $[Cr(H_2O)_5 Cl]$; $Cr(H_2O)_3 Cl_3$; $Ni(NH_3)_4 Cl_2$; $[NH_4]_2 [NiCl_6]$

    (1) only $[Cr(H_2O)_5 Cl]$

    (2) $Cr(H_2O)_3 Cl_3$ and $[NH_4]_2 [NiCl_6]$

    (3) $Cr(H_2O)_3 Cl_3$ and $Ni(NH_3)_4 Cl_2$

    (4) only $Ni(NH_3)_4 Cl_2$

P.T.O.

160. How many moles of iodine will be equivalent to one mole of hydrogen peroxide in a redox reaction ?

(1) 1 mole

(2) 1/2 mole

(3) 2 mole

(4) 4 mole

SECTION - B

(MATHEMATICS)

161. The last digit of 2^{199} is :

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

162. If the coefficient of x^7 and x^8 in $\left(2+\dfrac{x}{3}\right)^n$ are equal, then n is :

    (1) 15   (2) 45   (3) 55   (4) 25

163. The value of $\begin{vmatrix} a & b & 0 \\ 0 & a & b \\ b & 0 & a \end{vmatrix}$ is :

    (1) a^3 (2) b^3

    (3) $a^3 - b^3$ (4) None of these

164. The value of the roots of determinant $\begin{vmatrix} x-3 & 2x & x-1 \\ 0 & x+1 & 2x-3 \\ 0 & 0 & x-1 \end{vmatrix} = 0$ are :

    (1) Real and distinct   (2) Irrational

    (3) Imaginary   (4) Coincident

165. The matrix $\begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$ is

    (1) Idempotent   (2) Not nilpotent

    (3) Nilpotent of order 2   (4) Nilpotent of order 3

166. If A is a 3×3 matrix with rank 2 and B is a 3×3 matrix with rank 3, then :

(1) $\rho\,(AB) \leq 1$

(2) $\rho\,(AB) \leq 2$

(3) $\rho\,(AB) = 3$

(4) $\rho\,(AB) = 6$

167. If the roots of $x^2 - bx + c = 0$ are two consecutive integers, then $b^2 - 4c$ is :

(1) 0

(2) 2

(3) 1

(4) none of these

168. If $a + b + c = 0$, then the quadratic equation $3ax^2 + 2bx + c = 0$ has

(1) Imaginary roots

(2) at least one root in $[0,1]$

(3) one root in $[2,3]$ and other in $[-2,-1]$

(4) None of these

169. For what values of k, the following equations are inconsistent ?

$3x + 2y - 5x = 3$

$5x - 4y - z = 5$

$2x - 6y + kz = 9$

(1) 0

(2) 10

(3) 4

(4) none of these

170. The solution of the differential equation $\dfrac{dy}{dx} = (4x + y + 1)^2$ is :

(1) $4x + y + 1 = \tan(2x + c)$

(2) $4x + y + 1 = 2\tan(2x + c)$

(3) $2(4x + y + 1) = \tan(2x + c)$

(4) $\tan(4x + y + 1) = 2x + c$

171. Given that $\dfrac{dy}{dx} \cdot \dfrac{dx}{dy} = 1$. Which one of the following is always true ?

(1) $\dfrac{d^2y}{dx^2} \cdot \dfrac{dy}{dx} + \left(\dfrac{dy}{dx}\right)^2 \dfrac{d^2x}{dy^2} = 0$

(2) $\dfrac{d^2y}{dx^2} \dfrac{dx}{dy} + \left(\dfrac{dy}{dx}\right)^2 \dfrac{d^2x}{dy^2} = 0$

(3) $\dfrac{d^2y}{dx^2} \left(\dfrac{dy}{dx}\right)^2 + \dfrac{dy}{dx} \dfrac{d^2x}{dy^2} = 0$

(4) $\dfrac{d^2y}{dx^2} \dfrac{dx}{dy} + \dfrac{dy}{dx} \dfrac{d^2x}{dy^2} = 0$

172. The differential equation $(2x^2 + by^2) dx + cxy dy = 0$ is made exact by multiplying the integrating factor $1/x^2$. Then :

(1) $2c = b$

(2) $c = b$

(3) $2b + c = 0$

(4) $2c + b = 0$

173. The boundary value problem $\dfrac{d^2y}{dx^2} + y = 0$, $x \in [0, \pi]$, $y(0) = 0$, $y(\pi) = 0$ has :

(1) Unique solution

(2) Infinitely many solutions

(3) No solution

(4) Finitely many solutions

174. A differential equatin $\dfrac{dy}{dx} = y \tan x - 2 \sin x$ has an integrating factor :

(1) $\cos x$

(2) $e\int \tan x\, dx$

(3) $e^{-\int \sin x\, dx}$

(4) $e\int \cos x\, dx$

175. The integrating factor of the differential equation $(x^2 + y^2 + 2x) dx + 2y dy = 0$ is :

(1) e^x

(2) $\log x$

(3) e^{xy}

(4) ex^2

P.T.O.

176. The particular integral of $(D^2 - 2D)y = e^x \sin x$ is :

(1) $-\dfrac{1}{2} e^x \sin x$

(2) $e^x \cos y$

(3) $-\dfrac{1}{2} e^x \cos y$

(4) none of these

177. $\displaystyle \int_0^\infty \frac{\sin t}{t} dt$ equals to :

(1) 0

(2) π

(3) $\dfrac{\pi}{4}$

(4) $\dfrac{\pi}{2}$

178. The inverse laplace transform of $\dfrac{1}{s^2(s^2+1)}$ is :

(1) $t + \sin t$

(2) $1 - \sin t$

(3) $t - \sin t$

(4) $t + \cot t$

179. If the laplace transform of y(t) is y(s), then application of laplace transform in initial value problem $y'' + 9y = 6\cos 3t$, y (0) = 2, y' (0) = 0 gives that :

(1) $y(s) = \dfrac{2s^3 + 24s}{(s^2+9)^2}$

(2) $y(s) = \dfrac{5s^3 + 12s}{(s^2+9)}$

(3) $y(s) = \dfrac{s^2 + 18s}{(s^2+9)^2}$

(4) none of these

180. The inverse laplace transform of $\dfrac{s+1}{s^2+6s+25}$ is :

(1) $e^{-3t}(\cos 4t - \dfrac{1}{2}\cos 4t)$

(2) $e^{-3t}(\sin 4t - \dfrac{1}{2}\cos 4t)$

(3) $e^{-3t}(\cos 4t - \dfrac{1}{2}\sin 4t)$

(4) none of these

181. The integral equation $y(x) = \int_0^x (x-t) \dot{y}(t)\, dt - x \int_0^1 (1-t)\, y(t)\, dt$ is equivalent to :

(1) $y^{11} - y = 0,\ y(0) = 0,\ y(1) = 0$

(2) $y^{11} - y = 0,\ y(0) = 0,\ y'(0) = 0$

(3) $y^{11} + y = 0,\ y(1) = 0,\ y(1) = 0$

(4) $y^{11} + y = 0,\ y(0) = 0,\ y'(0) = 0$

182. The solution of the integral equation $g(s) = s + \int_0^1 su^2 g(u)\, du$ is :

(1) $g(t) = \dfrac{3t}{4}$ (2) $g(t) = \dfrac{4t}{3}$ (3) $g(t) = \dfrac{2t}{3}$ (4) $g(t) = \dfrac{3t}{2}$

183. Convert the following differential equation into an integral equation :

$y'' + \lambda xy + f(x),\ y(0) = 1,\ y'(0) = 0$:

(1) $y(x) = 1 + \int_0^x (x-t)\, [f(t) - \lambda\, ty(t)]\, dt$

(2) $y(x) = 1 + \int_0^x (x-t)\, [2f(t) - \lambda\, t^2 y(t)]\, dt$

(3) $y(x) = 1 - \int_0^1 (x-t)\, [f(t) - \lambda\, ty(t)]\, dt$

(4) none of these

184. The laplace transform of $\dfrac{\sin at}{t}$ is :

(1) $\cot^{-1} \dfrac{2as}{s^2 + a^2}$

                          (2) $\cot^{-1} \dfrac{s}{a}$

(3) $\tan^{-1} \dfrac{s}{a}$

                          (4) $\tan^{-1} \dfrac{2as}{s^2 + a^2}$

185. The number of generators of a cyclic group of order 12 are :

(1) 2   (2) 6   (3) 12   (4) 4

186. The number of 5-sylow subgroups of $\mathbb{Z}_{20}$ is :

(1) 1   (2) 4   (3) 5   (4) 6

187. Which of the following cannot be the cardinality of a field ?

(1) 4   (2) 6   (3) 7   (4) 27

188. What is the dimension of a vector subspace W of a vector space $\mathbb{R}^3(\mathbb{R})$, where $W = \{(a, b, c) : a + b = c\}$

(1) 1   (2) 2
(3) 3   (4) none of these

189. Dimension of a vector space $\mathbb{C}^3(\mathbb{R})$ is :

(1) 3   (2) 6
(3) 9   (4) none of these

190. Which of the following is not a linear transformation ?

(1) $T : \mathbb{R}^3 \to \mathbb{R}^2$ defined by $T(x,y,z) = (x,z)$
(2) $T : \mathbb{R}^3 \to \mathbb{R}^3$ defined by $T(x,y,z) = (x, y-1, z)$
(3) $T : \mathbb{R}^2 \to \mathbb{R}^2$ defined by $T(x,y) = (2x, y-x)$
(4) $T : \mathbb{R}^2 \to \mathbb{R}^2$ defined by $T(x,y) = (y-x)$

191. Newton's iterative formula to find $\sqrt{N}$ is :

(1) $x_{n+1} = x_n (2 - Nx_n)$ (2) $x_{n+1} = x_n (2 + Nx_n)$

(3) $x_{n+1} = 2 \left(x_n + \dfrac{N}{x_n}\right)$ (4) none of these

192. The number i^i is equal to :

(1) 0   (2) 1

(3) $\dfrac{\pi}{2}$ (4) none of these

193. The complex number $\frac{1+2i}{1-2i}$ lies in the :

   (1) I quadrant
   (2) II quadrant
   (3) III quadrant
   (4) IV quadrant

194. Let A $= \begin{bmatrix} 0 & \omega \\ \omega & 0 \end{bmatrix}$, where ω is a complex cube root of unity. Then A^{24} is :

   (1) A^2
   (2) A
   (3) Zero matrix
   (4) Identity matrix

195. The sum of the infinite series $\frac{2}{3!}+\frac{4}{5!}+\frac{6}{7!}+\frac{8}{9!}+\dots\infty$ is :

   (1) e
   (2) $2e$
   (3) $\frac{1}{e}$
   (4) $\frac{3e}{2}$

196. If $\frac{1}{\log_a x}+\frac{1}{\log_c x}=\frac{2}{\log_b x}$, then a, b, c are in :

   (1) H.P.
   (2) A.P.
   (3) G.P.
   (4) None of these

197. If f is twice differentiable function such that $f''(x) = -f(x)$, $f(x)= g(x)$ and $h(x) = [f(x)]^2 + [g(x)]^2$. If $h(5) = 11$ then $h(10)$ is equal to :

   (1) 22
   (2) 16
   (3) 121
   (4) none of these

198. The sum of the series : $1 + \frac{2}{1.2.3}+\frac{2}{2.3.4}+\frac{2}{3.4.5}+\frac{3e}{2}+\dots$ is :

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

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199. If $f(x)$ is differentiable in $[a, a + h]$, there exists at least one real number θ such that :

$f(a + h) - f(a) = h\, f'(a + \theta h).$

Then θ has the value :

(1) $\theta = 1$ (2) $\theta = 0$

(3) less than θ (4) none of these

200. The asymptote of the curve $r\theta = a$ is :

(1) $r\sin\theta = a$ (2) $r = a\sin\theta$

(3) $r = a\cos\theta$ (4) $r\cos\theta = a$

SECTION - B

(PHYSICS)

201. If the kinetic energy of a free electron doubles, its de Broglie wavelength changes by the factor :

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

202. If the critical angle for total internal reflection from a medium to v a c °. Then velocity of light in the medium is :

(1) 1.5×10^8 m/s   (2) 2.5×10^8 m/s

(3) 3.8×10^8 m/s   (4) 5.5×10^8 m/s

203. An ideal black body is represented by :

(1) A metal coated with a black dye

(2) A glass surface coated with coaltar

(3) A hollow enclosure blackened from inside and having a small hole

(4) A lump of charcoal heated to a high temperature

204. Out of the following, which one is **not** an example of capillary action ?

(1) Ploughing of the field

(2) Absorption of ink in a blotting paper

(3) floating of wood on the surface of water

(4) Rise of oil in the wick of a lamp

205. At what temperature, the rms speed of gas molecules is half the value at NTP ?

(1) 68.25 K   (2) 273 K   (3) 345 K   (4) 0 K

P.T.O.

206. The velocity of sound in any gas depends upon :
   (1) Wavelength of sound only
   (2) Density and elasticity of gas
   (3) Intensity of sound waves only
   (4) Amplitued and frequency of sound

207. The escape velocity for a body on the earth is 11.2 km/s. If the radius of the earth is increased 4 times, then the escape velocity would be :
   (1) 44.8 km/s   (2) 33.8 km/s
   (3) 25.7 km/s   (4) 22.4 km/s

208. If dQ is the amount of heat supplied and dW is the work done, then in isothermal process :
   (1) dQ + dW = 0   (2) dQ – dW = 0
   (3) dW/dQ = 0   (4) none of the above

209. A capacitor has a capacitive reactance of 400 Ω when connected to a 100 v, 25 Hz supply. The value of capacitance is :
   (1) 15.92 μF   (2) 57.34 μF
   (3) 92.04 μF   (4) 23.12 μF

210. In a gas the transport of momentum gives rise to the phenomenon of :
   (1) Viscosity   (2) Conduction
   (3) Diffusion   (4) Volume

211. A decrease in the Helmholtz function of a system is equal to :
   (1) Change in temperature   (2) External workdone
   (3) Change in internal energy   (4) All of the above

212. A body of mass m is suspended from a spring fo force constant k. The maximum distance up to which the body can be pulled down for the oscillation to remain harmonic is :
   (1) 2 mg/k   (2) mg/k   (3) 2k/mg   (4) k/mg

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213. A process 'A' is irreversible and adiabatic. Process 'B' is reversible and adiabatic. The entropy change in process 'A' and process 'B', respectively are :
    (1) Zero and positive
    (2) Zero and negative
    (3) Negative and zero
    (4) Positive and zero

214. In terms of magnetic properties, Oxygen belongs to ?
    (1) Magnetic materials
    (2) Ferromagnetic materials
    (3) Paramagnetic materials
    (4) Diamagnetic materials

215. The current at resonance in a series L-C-R circuit is 0.2 mA. If the applied voltage is 250 mV at a frequency of 100 kHz and the circuit capacitance is 0.04 μF, the value of circuit inductance is :
    (1) 63.3 μH
    (2) 24.4 μH
    (3) 12.7 μH
    (4) 34.9 μH

216. For a given material, the Young's modulus is 2.4 times that of rigidity modulus. Its Poisson's ratio is :
    (1) 2.4
    (2) 1.2
    (3) 0.4
    (4) 0.2

217. Which one of the following phenomenon shows particle nature of light :
    (1) Polarization
    (2) Photoelectric effect
    (3) Interference
    (4) Refraction

218. The temperature of a furnace is 2327°C and the intensity is maximum in its radiation spectrum at 1200 A°. If the intensity in the spectrum of a star is maximum at 4800 A°, then the surface temperature of the star is :
    (1) 650 °K
    (2) 600 °K
    (3) 480 °K
    (4) 750 °K

219. Stars appear to move from east to west because :
    (1) All stars move from east to west
    (2) The earth rotates from west to east
    (3) The earth rotates from east to west
    (4) The background of the stars moves from west to east

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220. The impurity with which pure silicon should be doped to make a p-type semiconductor is :
   (1) Phosphorus
   (2) Boron
   (3) Antimony
   (4) Arsenic

221. Light Emitting Diode (LED) converts :
   (1) Light energy into electrical energy
   (2) Electrical energy into light energy
   (3) Thermal energy into light energy
   (4) Mechanical energy into electrical energy

222. Pascal is the unit for :
   (1) Thrust
   (2) Pressure
   (3) Frequency
   (4) Conductivity

223. Sound waves in air are :
   (1) Transverse
   (2) Longitudinal
   (3) Electromagnetic
   (4) Polarised

224. When a red glass is heated in dark room, it will seem :
   (1) Black
   (2) Green
   (3) Yellow
   (4) Red

225. If the spinning speed of the earth is increased, then the weight of the body at the equator :
   (1) Increases
   (2) Decreases
   (3) Doubles
   (4) Does not change

226. A body of mass 10g is set to rotate in a circular path by means of a string 200 cm long. If it makes 3 complete revolution in 2s, find the tension of the string :
   (1) 1.77 N
   (2) 9.65 N
   (3) 3.45 N
   (4) 7.36 N

227. Which one of the following pair of rays is electromagnetic in nature :
   (1) Alpha rays and X-rays
   (2) Alpha rays and cosmic rays
   (3) Infrared rays and beta rays
   (4) Infrared rays and X-rays

228. The moment of inertia of a 0.98 Kg bicycle wheel rotating about its center is 0.13 Kgm². What is the radius of this wheel, assuming the weight of the spokes can be ignored ?

(1) 0.45 m   (2) 0.36 m   (3) 0.79 m   (4) 1.01 m

229. Optical fiber works on the principle of :

(1) Refraction   (2) Internal refraction

(3) Scattering   (4) Interference

230. How much work has been done by an ideal gas, when the temperature of 5 moles of the gas increases by 2 Kelvin in an isobaric process ?

(1) 83.1 J   (2) 73.2 J   (3) 12.6 J   (4) 33.7 J

231. A closed surface encloses a net charge of 10nC. What is the net electric flux through the surface ? ($\epsilon_0 = 8.85 \times 10^{-12}$ F/m)

(1) 1130 Nm²/C   (2) 1654 Nm²/C

(3) 1931 Nm²/C   (4) 4397 Nm²/C

232. A and B are two wires. The radius of A is twice that of B. They are stretched by the same load. Then the stress on B is :

(1) Equal to that on A   (2) Four times that on A

(3) Two times that on A   (4) Half that on A

233. The Young's modulus of three materials are in the ratio 2 : 2 : 1. Three wires made of these materials have their cross-sectional areas in the ratio 1 : 2 : 3. For a given stretching force the elongation's in the three wires are in the ratio :

(1) 1 : 2 : 3   (2) 3 : 2 : 1

(3) 5 : 4 : 3   (4) 6 : 3 : 4

234. When an electron falls from an orbit where n = 2 to n = 1 :

(1) A photon is emitted

(2) A photon is absorbed

(3) The atomic energy decreases to zero

(4) The atomic energy increases

P.T.O.

235. A rod of lenght l and radius r is joined to a rod of length $l/2$ and radius $r/2$ of same material. The free end of small rod is fixed to a rigid base and the free end of larger rod is given a twist of θ, the twist angle at the joint will be :

(1) $\theta/4$ (2) $\theta/2$ (3) $5\theta/6$ (4) $8\theta/9$

236. Pressure inside two soap bubbles is 1.01 and 1.02 atmospheres. Ratio between their volume is :

(1) $102 : 101$ (2) $(102)^3 : (101)^3$

(3) $8 : 1$ (4) $2 : 1$

237. Two pendulums have the time periods T and $5T/4$. They start SHM at the same time from the mean position. After hoe many oscillations of the smaller pendulum they will be again in the sampe phase :

(1) 5   (2) 4   (3) 11   (4) 6

238. Phenomenon in which radiations split matter in to ions is called ?

(1) Denaturing   (2) Ionization

(3) Condensation   (4) Excitation

239. In Rutherford's Gold Foil experiment, most of the alpha particles passed through the foil un-deflected. Which of the follwoing properties of the atom can be explained from this observation ?

(1) The atom's negative charge is concentrated in the nucleus

(2) The nucleus has electrons and protons

(3) The atomic mass is distributed evenly throughout the atom

(4) The size of the nucleus is much less than the size of the atom

240. A metal surface is illuminate one by one by photons of energy 2.0 eV and 4.0 eV respectively. The work function of the metal is 0.5 eV. What is the ratio of the maximum speeds of electrons emitted in two cases ?

(1) 0.78   (2) 0.65   (3) 0.34   (4) 0.22

ROUGH WORK
एफ कार्य

P.T.O.

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर
केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।

2. परीक्षा भवन में *लिफाफा रहित प्रवेश-पत्र के अतिरिक्त,* लिखा या सादा कोई भी खुला कागज साथ में न लायें।

3. *उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।*

4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।

5. *उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।*

6. *ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।*

7. *उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।*

8. *प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।*

9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।

10. *ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।*

11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।

12. परीक्षा के उपरान्त *केवल ओ एम आर उत्तर-पत्र* परीक्षा भवन में जमा कर दें।

13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।

14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।