

**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO**

Booklet Serial No.

000441

Test Booklet Series


**TEST BOOKLET - 2022**  
**SCIENTIFIC OFFICER BIOLOGY**  
**(04)**



**Time Allowed: Two Hours**

**Maximum Marks: 120**

**INSTRUCTIONS**

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES **NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write anything else on the Test Booklet. 
4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Response sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Response Sheet provided. See directions in the Response Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Response sheet the response to various items in the Test Booklet you have to fill in some particulars in the Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator **only the Response Sheet**. You are permitted to take away with you the Test Booklet and Candidate's Copy of the Response Sheet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers:**  
**THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE.**
  - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **0.25** of the marks assigned to that question will be deducted as penalty.
  - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
  - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no **penalty** for that question.

**SEAL**

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1. The human ABO blood groups was discovered by:
  - A) Karl Landsteiner
  - B) Grager Mendel
  - C) Alec Jaffreys
  - D) Watson and Crick
  
2. Which of the following cell type is anucleated in nature?
  - A) WBC
  - B) RBC
  - C) Spermatozoa
  - D) Oocytes
  
3. The growing phase of hair is called as
  - A) Anagen
  - B) Catagen
  - C) Telogen
  - D) None of these
  
4. Glycophorin A (GPA) can be used as an antigen for the detection of which body fluid?
  - A) Blood
  - B) Semen
  - C) Urine
  - D) Saliva
  
5. The presumptive test for blood
  - A) Is human specific
  - B) Is mammal specific
  - C) Is primate specific
  - D) None of the above
  
6. Where are amylases secreted?
  - A) Salivary glands
  - B) Pancreas
  - C) Both of the above
  - D) None of the above
  
7. In some individuals, A, B, and O antigens are widely distributed in tissues and other body secretions. Such individuals are called as:
  - A) Secretors
  - B) Non-secretors
  - C) Semi-secretors
  - D) Quasi-secretors

8. Which serum antibody does a type B individual have?
- A) Anti-A
  - B) Anti-B
  - C) Anti-A and Anti-B
  - D) Neither
9. The greatest dimension of an incised wound is
- A) Breadth
  - B) Depth
  - C) Length
  - D) Breadth and depth are equal
10. A haploid human cell has how many numbers of chromosomes?
- A) 46
  - B) 23
  - C) 12
  - D) 10
11. Odontoblasts produce
- A) Dentine
  - B) Cement
  - C) Enamel
  - D) Peridental membrane
12. Number of bones in each limb of a man
- A) 16
  - B) 20
  - C) 22
  - D) 30
13. Floating ribs in man are
- A) 6 pairs
  - B) 2 pairs
  - C) 4 pairs
  - D) 3 pairs

14. Which is not useful in identification of individual from skeletalized remains
- A) Dentition
  - B) Tattoos
  - C) Surgical implants
  - D) Bone abnormalities
15. Distribution of pigment granules in hair helps in identification of
- A) Animal hair
  - B) Human head hair
  - C) Species of animals
  - D) Human beard hair
16. Which is light colored and wider part of annual ring
- A) Autumn wood
  - B) Heart wood
  - C) Sap wood
  - D) Spring wood
17. Nerve endings of hair follicle are known as
- A) Hair root plexuses
  - B) Papilla
  - C) Arrector pilli
  - D) Dermis
18. Which is not present in the skeletal muscle
- A) A-Band
  - B) H-Band
  - C) Z-Band
  - D) K-Band
19. Entomological evidence helps in
- A) Identification of deceased
  - B) Determination of age of the deceased
  - C) Knowing time since death
  - D) Habitat of the deceased

20. Which is a dominant trait
- A) Haemophilia
  - B) Albinism
  - C) Colour blindness
  - D) Rh factor
21. Blood group typing can be useful to
- A) Exclude a suspect
  - B) Identify a suspect with high degree of certainty
  - C) Both of these
  - D) None of these
22. Which of the following is a constituent of blood?
- A) Erythrocytes
  - B) Leucocytes
  - C) Platelets
  - D) All of these
23. Which of the following parameters can be estimated by analysis of human bones?
- A) Age of the individual
  - B) Stature of the individual
  - C) Race of the individual
  - D) All of these
24. In human children, how many teeth are deciduous in nature?
- A) 15
  - B) 20
  - C) 32
  - D) 14
25. Which of the following involves excess antigen?
- A) Prozone
  - B) Postzone
  - C) Zone of equivalence
  - D) None of these

26. Which of the following antigens are used for identification of semen stains?
- A) Prostate Specific Antigen
  - B) Semenogelin
  - C) Both (A) and (B)
  - D) None of the above
27. The adult hemoglobin is designated as:
- A)  $\alpha 1\beta 1$
  - B)  $\alpha 2\beta 2$
  - C)  $\alpha 3\beta 3$
  - D)  $\alpha 4\beta 4$
28. Which of the following is a test used for the detection of blood stains?
- A) Phenolphthalin Assay
  - B) Leucomalachite Green (LMG) Assay
  - C) Trimethylbenzidine (TMB) test
  - D) All of these
29. Jaffe color test using picric acid to convert creatinine to colored creatinine picrate is used for detection of
- A) Vaginal secretion
  - B) Menstrual blood
  - C) Urine
  - D) Vomitus
30. The most common means of identification of faeces sample is by the detection of
- A) Ptylin
  - B) Glycogen
  - C) Urobilinogen
  - D) Creatin

31. Deltoid ridge is present on

- A) Femur
- B) Tibia
- C) Humerus
- D) Radius

32. Buckling is observed in

- A) Eyebrow
- B) Head hair
- C) Pubic hair
- D) Beard hair

33. Which organ in a dead body degrades faster due to autolysis

- A) Pancreas
- B) Prostrate
- C) Heart
- D) Brain

34. Cartilage is formed by

- A) Osteocytes
- B) Chondroblasts
- C) Chondrocytes
- D) Osteoblasts

35. Human skull bones are joined by

- A) Cartilaginous joint
- B) Hinge joint
- C) Fibrous joint
- D) Synovial joint



36. Guard hairs are?
- A) Large, stiff hair that make the outer part of animal's coat
  - B) Thinner softer hair that provide warmth and bulk.
  - C) Long stiff often white hair around the snout and muzzle.
  - D) Hair that guard any external opening of an animal.
37. Skeletal maturity in children and young adult is best measured by :
- A) Radiological assessment of skull
  - B) Radiological assessment of Lumber vertebrae
  - C) Radiological assessment of hand and wrist bone development
  - D) Radiological assessment of leg and pelvis region bone
38. Which is a fruit fiber
- A) Coir
  - B) Sisal
  - C) Rosella
  - D) Mesta
39. Human embryo completes development in
- A) 180 days
  - B) 280 days
  - C) 260 days
  - D) 300 days
40. Which is synonym of hypostasis
- A) Putrefaction
  - B) Rigor mortis
  - C) Livor mortis
  - D) Cadaveric spasm
41. Which of the following cell types are syncytials?
- A) Blood cells
  - B) Muscle cells
  - C) Sperm cells
  - D) None of these

42. Which of the following bone cell types are responsible for dissolving and recycling the bone matrix?
- A) Osteocytes
  - B) Osteoprogenitor cells
  - C) Osteoclasts
  - D) All of these
43. When antigen is present in excess the unbound antigen binds to the immobilized antibody, preventing the formation of the antibody-antigen-antibody sandwich. This artifact is known as
- A) High-dose hook effect
  - B) High-dose inhibition effect
  - C) Precipitation effect
  - D) Magnetic effect
44. Which of the following performs better when testing an aged blood stain?
- A) Lattes Crust Assay
  - B) Absorption-elution assay
  - C) Kastler-Meyer assay
  - D) None of these
45. The following is not red cell isoenzymes:
- A) Adenosine deaminase
  - B) Transferrin
  - C) Glutamate pyruvate transaminase
  - D) Phosphoglucomutase
46. Vaginal secretion consists of
- A) Urea
  - B) Doderlain's bacilli
  - C) Glyoxalase I
  - D) Serum Cholinesterase

47. Which of the following sutures of the skull is last to fuse?
- A) Basi-occiput with Basisphenoid
  - B) Sagittal
  - C) Coronal
  - D) Lamdoid
48. Seminal fluid chlorine originate from the
- A) Seminal vesicle
  - B) Sertoli's cell
  - C) Leydig cell
  - D) Prostate
49. Apart from humans, P<sub>38</sub> in seminal stain is found in
- A) Cat
  - B) Fowl
  - C) Rat
  - D) Cow
50. Shoval shaped incisors are found amongst
- A) Mongoloids
  - B) Negroid
  - C) Aboriginal Australians
  - D) Eskimos
51. Tooth development starts in uterine life in
- A) First month
  - B) Third month
  - C) Fifth month
  - D) Ninth month
52. Which is related to skull
- A) Coracoids
  - B) Arytenoids
  - C) Pterygoid
  - D) Scaphoid
53. Microscopic identification of Cannabis involves identification of
- A) Long cylindrical sclerenchymatous hair
  - B) Spines
  - C) Cystolith hairs
  - D) Fibers

54. Which is not correct
- A) Hardwood are not necessarily hard
  - B) Softwood are not necessarily soft
  - C) Presence of pores and vessels differentiate between hardwood and softwood
  - D) Softwood are derived from angiosperm
55. Variants of Hexose-6-phosphate is found in
- A) Semen only
  - B) Sweat only
  - C) Blood only
  - D) Saliva only
56. Which protein marker is not found in Human sperm as well as seminal plasma
- A) Phosphoglucomutase
  - B) Peptidase A
  - C) Phosphoglucose isomerase
  - D) Peptidase-D
57. Individual who produces A, B, H blood group specific substances in saliva is called
- A) Secretor
  - B) Non- Secretor
  - C) Lewis Negative
  - D) MN positive
58. Which sample is collected for examination of food poisoning by microorganisms?
- A) Stomach contents Sample
  - B) Tear Sample
  - C) Stool Sample
  - D) Saliva Sample
59. Teeth are numbered by
- A) The Universal, Palmer, & FDI Tooth Numbering Systems
  - B) Dental Council of India System
  - C) Dentists have their separate system
  - D) All of the above
60. Tamm Horsfall glycoprotein is found in
- A) Urine
  - B) Saliva
  - C) Vaginal secretion
  - D) Sweat

61. The study of insects in relation to a criminal investigation is called as:
- A) Odontology
  - B) Dactyology
  - C) Entomology
  - D) Serology
62. Polymerase Chain Reaction (PCR) technique was discovered by
- A) H. G. Khurana
  - B) Kary Mullis
  - C) Peter Gill
  - D) Richard Li
63. Tailing of a wound is seen in
- A) Chop wound
  - B) Contusion
  - C) Laceration
  - D) Incised wound
64. Leuchomalachite green test is done for examination of
- A) Urine
  - B) Sweat
  - C) Saliva
  - D) Blood
65. Correct match of Tiger Reserve and its location is:
- A) Manas-Assam
  - B) Corbett-Madhya Pradesh
  - C) Bandipur-Tamilnadu
  - D) Palanau-Odisha
66. Which is responsible for causing deviation from H-W equilibrium
- A) Small population
  - B) Isolated population
  - C) Lack of selection pressure
  - D) Random mating

67. What is the normal pH of human blood?
- A) 6.5
  - B) 7.3
  - C) 8.5
  - D) 9.0
68. Which of the following genetic marker is used for forensic DNA analysis
- A) VNTRs
  - B) STRs
  - C) SNPs
  - D) All of these
69. Dried blood stains may be collected by
- A) Cutting out a stain
  - B) Scrapping a stain
  - C) Tape lifting a stain
  - D) All of these
70. The total number of carpal bones in a child aged 16 years is
- A) 4
  - B) 6
  - C) 8
  - D) 10
71. The period of mixed dentition extends
- A) 4-10 years
  - B) 4-12 years
  - C) 6-12 years
  - D) 8-12 years
72. Superimposition is a technique used for
- A) Determination of Stature
  - B) Individualisation of deceased
  - C) Determination of Age
  - D) Determination of Sex

73. It is true that Anti-D is
- A) A typical antibody
  - B) Auto antibody
  - C) Warm antibody
  - D) Cold antibody
74. Cross over electrophoresis was developed by
- A) Smithies
  - B) Bussard
  - C) Miller
  - D) Culliford
75. Wright's stain is called a
- A) Polychromatic stain
  - B) Biochromatic stain
  - C) Photochromatic stain
  - D) Monochromatic stain
76. Absorption-Elution method of blood grouping was first proposed by
- A) Siracussa in 1923
  - B) Siracussa and Kind in 1960
  - C) Mickolls and Perrira in 1945
  - D) Race and Sanga in 1975
77. Ouchterlony assay is a forensic serological testing used to determine whether samples have come from the same or different sources. This test is a form of
- A) Single immunodiffusion
  - B) Double immunodiffusion
  - C) Crossed immunodiffusion
  - D) Rocket immunodiffusion
78. Which of the following may be used in the dark?
- A) Kastle-Meyer test
  - B) LMG test
  - C) Luminol test
  - D) Teichmann test

79. A brownish colored scab over an abrasion is formed by
- A) <24hours
  - B) 2-3 days
  - C) 5-7 days
  - D) 10-15 days
80. The centre of ossification for the iliac crest appears by the age of
- A) 12 years
  - B) 14 years
  - C) 16years
  - D) 21 years
81. "Davidson Body" is present in
- A) Basophil
  - B) Neutrophil
  - C) Lymphocyte
  - D) Monocyte
82. Which of the following haemoglobin variant is not found in humans
- A) HbA
  - B) HbS
  - C) HbF
  - D) HbB
83. During blood coagulation, thromboplastin is released by:
- A) RBC
  - B) Blood plasma
  - C) Leucocytes
  - D) Clumped platelets and damaged tissues
84. "Chura post" is derived from
- A) *Cannabis sativa*
  - B) *Papaver somniferum*
  - C) *Croton tiglium*
  - D) *Abrusprecatorius*



85. HLA is located on
- A) Long arm of chromosome 6
  - B) Short arm of chromosome 6
  - C) Long arm of chromosome 4
  - D) Short arm of chromosome 4
86. Which of the following can be distinguished as human salivary amylase and human pancreatic amylase
- A) Starch iodine assay
  - B) Phadebas assay
  - C) RNA based assay
  - D) Use of human anti human salivary antibody
87. Semen sample having no sperms is called
- A) Oligospermic
  - B) Aspermic
  - C) Histospermic
  - D) Hematospermic
88. An Rh incompatibility between mother and fetus can occur if
- A) Only mother is Rh(-)
  - B) Fetus is Rh(+)
  - C) Pregnancy is second or later
  - D) All of the above
89. Colostrum is a form of
- A) Semen
  - B) Milk
  - C) Blood
  - D) Saliva
90. A hair cut by a blade or scissors will have
- A) A sharp edge
  - B) A blunt edge
  - C) Follicular tissue attached
  - D) A crushed edge

91. The causes of death in drowning are, except
- A) Gagging
  - B) Asphyxia
  - C) Ventricular fibrillation
  - D) Laryngeal spasm
92. Preliminary observations of the pooling of blood at the lowest part of the body caused by gravity is
- A) Rigor mortis
  - B) Livor mortis
  - C) Algor mortis
  - D) All of the above
93. Haase rule related to fetus is employed for the determination of
- A) Weight of fetus
  - B) Age of fetus
  - C) Height of fetus
  - D) Sex of fetus
94. In an SDS-PAGE
- A) Proteins are denatured by SDS
  - B) Proteins have the same charge to-mass ratio
  - C) Smaller proteins migrate more rapidly
  - D) All of the above
95. Urea Nitrate crystal test for urine produces \_\_\_\_\_ type of crystals.
- A) Hexagonal
  - B) Needle-shaped
  - C) Star shaped
  - D) Flattened
96. Enamel is present in which of the following part of the tooth:
- A) Root
  - B) Crown
  - C) Pulp
  - D) Dentine

97. Proportional relationship of size of various body parts with stature is known as
- A) Trigonometry
  - B) Somatometry
  - C) Allometry
  - D) Anthropometry
98. Skatole is a characteristic odour of ----
- A) Urine
  - B) Feces
  - C) Saliva
  - D) Semen
99. The formation of final purple coloured product made as a result of reaction of amino acids and ninhydrin is known as
- A) Gentian violet
  - B) Crystal violet
  - C) Rutherford purple
  - D) Ruhemann's purple
100. Barr and Bertram are associated with
- A) Nuclear sexing
  - B) Stature estimation
  - C) Age estimation
  - D) Brain mapping
101. Which of the following analysis can be carried out by forensic odontology
- A) Characteristics of teeth
  - B) Alignment of teeth
  - C) Bite mark analysis
  - D) All of these
102. The approximate number of genes found in human genome is
- A) 5,000-10,000
  - B) 20,000-25,000
  - C) 2.3 billion
  - D) 1,00,000 -5,00,000

103. Agarose is a linear polymer composed of
- A) D-galactose
  - B) L-galactose
  - C) Both of these
  - D) None of these
104. Identification of a suspect can be carried out by studying:
- A) Antigen Polymorphism
  - B) Protein Polymorphism
  - C) DNA Polymorphism
  - D) All of these
105. Which antigen is found in Saliva
- A)  $\alpha$  amylase
  - B) Glycophorin
  - C) Semenogelin
  - D) PSA
106. Which of the following is a potential source of extracellular nucleic acids
- A) RBCs
  - B) WBCs
  - C) Exosomes
  - D) None of these
107. The protein found in teeth enamel include
- A) Amelogenin
  - B) Ameloblastin
  - C) Enamelin
  - D) All of these
108. The portion at each end of a long bone is called as:
- A) Matrix
  - B) Epiphysis
  - C) Cavity
  - D) Marrow

109. DNA methylation-based assay for bodily fluid identification relies on
- A) TDMRs
  - B) MeDIP
  - C) MSRE-PCR
  - D) All of these
110. Which of the microorganism is a predominant species in human vagina
- A) *Lactobacillus* spp.
  - B) *Streptococcus* spp.
  - C) *Bacteriodes* spp.
  - D) *Staphylococcus* spp.
111. Which of the following technique is regarded as a non-destructive technique of body-fluid identification
- A) Immuno-electrophoresis
  - B) Fluorescence Spectroscopy
  - C) Oxidation-Reduction tests
  - D) None of these
112. The chemical agent used in luminol test is
- A) 3-Aminophthalhydrazide
  - B) Triphenylmethane
  - C) Trimethylbenzidine
  - D) Phenolphthalin
113. Which of the following genes is used for the identification of blood by RT-PCR assay ?
- A) *KLK3*
  - B) *PRM1*
  - C) *SPTB*
  - D) *PRM2*
114. Which of the following tests is mostly used to distinguish between Penpheral blood and menstrual blood
- A) Dane's Staining method
  - B) D-dimer assay
  - C) Lugol's Iodine
  - D) Periodic Acid-Schiff method

115. Para-dimethylaminocinnamaldehyde (DMAC) assay is used for forensic identification of:
- A) Urine stains
  - B) Blood stains
  - C) Semen stains
  - D) Vomit stains
116. Which of the following tests is a confirmatory test for Semen
- A) Visual Examination
  - B) Fluorometric Assay
  - C) Colorimetric Assay
  - D) Microscopic Examination
117. Fetal Hemoglobin (Hb) is replaced by adult Hemoglobin (Hb) after approximately \_\_\_\_\_ months of birth.
- A) 2 months
  - B) 12 months
  - C) 6 months
  - D) 36 months
118. Raised venous pressure from impaired venous return resulting in overdistension and rupture of venules is called as:
- A) Congestion
  - B) Petechial haemorrhages
  - C) Oedema
  - D) Cyanosis
119. Liquid blood sample is preserved in which preservative for forensic DNA examination?
- A) Sodium Fluoride
  - B) Ammonium Chloride
  - C) EDTA
  - D) Sulphur Dioxide
120. A smaller blood stain that originates during the formation of the parent stain as a result of blood impacting a surface is called as:
- A) Drip stain
  - B) Serum stain
  - C) Bubble ring stain
  - D) Satellite stain
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# ROUGH WORK

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