

BKM
PROVISIONAL ANSWER KEY

Name of the post	Assistant Professor, Oral Pathology and Microbiology, Class-1 (Dental)
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THE LINK FOR ONLINE OBJECTION SYSTEM WILL START FROM 01-02-2025; 10:00 AM ONWARDS

Instructions / સૂચન

Candidate must ensure compliance to the instructions mentioned below, else objections shall not be considered: -

- (1) Candidates have to pay fees of Rs.100/- for each objection. The fees can be paid from the link given herewith.
- (2) The Candidate will be able to submit objection only after payment of the fees. The generation of the receipt will only be considered as final submission.
- (3) The Candidate must retain the receipt of the payment of the fees. The fees, once paid, will not be refunded under any circumstances.
- (4) All the objections should be submitted through **ONLINE OBJECTION SUBMISSION SYSTEM** only. Physical or submission through any other means will not be considered.
- (5) All objections are to be submitted with reference to the Master Question Paper published with provisional answer key, published herewith on the website / online objection submission system. Objections should be sent referring to the Question No. & options of the Master Question Paper. Objections regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.
- (6) Objections and answers suggested by the candidate should be in compliance with the responses given by him in his answer sheet. Objections shall not be considered, in case, if responses given in the answer sheet /response sheet and submitted objections are differed.
- (7) Supportive document to the objection must be uploaded, without which objection will not be considered.

ઉમેદવારે નીચેની સૂચનાઓનું પાલન કરવાની તકેદારી રાખવી, અન્યથા વાંધા-સૂચન અંગે કરેલ રજૂઆતો ધ્યાને લેવાશે નહીં

- (1) ઉમેદવારે દરેક વાંધા દીઠ રૂપિયા ૧૦૦/- ફી ભરવાની રહેશે. જે ફી આ સાથે આપેલ લીંક ઉપરથી ભરી શકાશે.
- (2) ફી ભર્યા બાદ જ વાંધો સબમીટ થઈ શકશે. ફી ભર્યાની આખરી પહોંચ જ આખરી સબમીશન ગણાશે.
- (3) ફી ભર્યાની પહોંચ ઉમેદવારે સાચવી રાખવાની રહેશે. એક વાર ભરેલ ફી કોઈ પણ પરિસ્થિતિમાં પરત આપવામાં આવશે નહિ.
- (4) વાંધા ફક્ત **ઓનલાઇન ઓબ્જેક્શન સબમીશન સીસ્ટમ** દ્વારા જ સબમીટ કરવાના રહેશે. રૂબરૂ, ટપાલ અથવા ઈ-મેઇલ કે અન્ય કોઈ રીતે આયોગને મોકલવામાં આવેલ વાંધા ધ્યાને લેવામાં આવશે નહીં, જેની ખાસ નોંધ લેવી.
- (5) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ ન કરતાં, તમામ વાંધા-સૂચનો વેબસાઇટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર) ના પ્રશ્નક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા. માસ્ટર પ્રશ્નપત્રમાં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા ધ્યાને લેવામાં આવશે નહીં.
- (6) ઉમેદવારે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉત્તરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉત્તરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા ધ્યાને લેવાશે નહીં.
- (7) વાંધા માટે સંદર્ભ જોડવો આવશ્યક છે, જેના વિના વાંધો ધ્યાને લેવામાં આવશે નહીં.

Website link for online objection submission system: https://www.formonline.co.in/GPSC_TRACK/SearchPage.aspx

8. Which staining method is used to highlight acidic mucopolysaccharides?
(A) Hematoxylin and Eosin
(B) Alcian Blue
(C) Van Gieson's stain
(D) Wright's stain
9. A 45-year-old male presents with a white, painless lesion on the buccal mucosa that cannot be scraped off. The patient has a history of chronic tobacco chewing.
What is the most likely diagnosis?
(A) Oral candidiasis
(B) **Leukoplakia**
(C) Lichen planus
(D) Oral squamous cell carcinoma
10. Transmission Electron Microscopy (TEM) is used to visualize
(A) Cellular organelles at ultrastructural level
(B) Thick tissue sections
(C) Surface features of tissues
(D) Live-cell dynamics
11. What is the principle behind Periodic Acid-Schiff (PAS) staining?
(A) Binding of acidic dyes to basic structures
(B) Oxidation of polysaccharides to aldehydes
(C) Deposition of silver particles
(D) Interaction with lipid components
12. Which fixative is best suited for preserving ultrastructure for electron microscopy?
(A) Formalin
(B) Glutaraldehyde
(C) Bouin's solution
(D) Ethanol
13. What is the resolving power of a Scanning Electron Microscope (SEM)?
(A) 0.2 mm
(B) 0.2 μm
(C) 2 nm
(D) 10 nm
14. Which signalling pathway is critical for the initiation of tooth development?
(A) Hedgehog
(B) Wnt
(C) TGF-beta
(D) BMP

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15. Which enzyme is essential for collagen cross-linking in dentin?
- (A) Lysyl oxidase (B) Alkaline phosphatase
(C) Collagenase (D) Matrix metalloproteinase
16. Which feature characterizes the "fish scale" appearance in hereditary dentinogenesis imperfecta?
- (A) Irregular dentin tubules
(B) Highly mineralized predentin
(C) Lack of DEJ demarcation
(D) Transparent enamel with dentin loss
17. A 50-year-old patient has a painless swelling in the parotid region for six months. FNAC reveals epithelial and myoepithelial cells with chondromyxoid stroma. Which is the most likely diagnosis?
- (A) Mucoepidermoid carcinoma
(B) Warthin's tumor
(C) Pleomorphic adenoma
(D) Adenoid cystic carcinoma
18. A 60-year-old male presents with a slowly growing and painless ulcer on the hard palate. Histopathology reveals perineural invasion. What is the most likely diagnosis?
- (A) Adenoid cystic carcinoma
(B) Mucoepidermoid carcinoma
(C) Squamous cell carcinoma
(D) Basal cell carcinoma
19. A 10-year-old child presents with a swelling in the anterior maxilla and radiographically showing a radiolucent lesion with calcifications. Which is the most likely tumor?
- (A) Ameloblastoma
(B) Adenomatoid odontogenic tumor
(C) Odontoma
(D) Central giant cell granuloma
20. A 12-year-old boy presents with multiple impacted teeth and supernumerary teeth. Radiographs reveal a retained primary teeth. What is the likely diagnosis?
- (A) Cleidocranial dysplasia
(B) Amelogenesis imperfecta
(C) Dentinogenesis imperfecta
(D) Paget's disease

21. A patient presents with asymptomatic radiolucency in the posterior mandible below the mandibular canal. What is the most likely diagnosis?
- (A) Radicular cyst
(B) Stafne bone defect
(C) Dentigerous cyst
(D) Traumatic bone cyst
22. A middle-aged male presents with multiple brown-black macules on the lips and oral mucosa. Which syndrome is suspected?
- (A) Peutz-Jeghers syndrome
(B) Addison's disease
(C) Laugier-Hunziker syndrome
(D) Melanoma
23. A 9-year-old boy presents with swelling in the mandibular molar region. Radiographs reveal a radiopaque lesion surrounded by a radiolucent halo. What is the diagnosis?
- (A) Cementoblastoma
(B) Odontoma
(C) Ameloblastic fibro-odontoma
(D) Compound odontoma
24. A newborn presents with a cystic swelling in the midline of the floor of the mouth. What is the most likely diagnosis?
- (A) Ranula
(B) Dermoid cyst
(C) Thyroglossal cyst
(D) Lymphangioma
25. A 15-year-old girl presents with gingival overgrowth and delayed shedding of primary teeth. Laboratory findings show hypophosphatemia. What is the likely diagnosis?
- (A) Vitamin D-resistant rickets
(B) Paget's disease
(C) Cleidocranial dysplasia
(D) Dentinogenesis imperfecta
26. A patient presents with a painful and punched-out lesion on the gingiva, covered by a grey pseudomembrane and halitosis. What is the most likely diagnosis?
- (A) Necrotizing ulcerative gingivitis (NUG)
(B) Herpetic gingivostomatitis
(C) Pemphigus vulgaris
(D) Aphthous ulcer

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27. A patient presents with multiple, small and pearly papules on the gingiva and buccal mucosa. Histological examination shows keratin-filled cysts. What is the diagnosis?
- (A) Gingival cysts of the newborn
 - (B) Fordyce granules
 - (C) Mucous retention cyst
 - (D) Lymphoepithelial cyst
28. A 10-year-old boy presents with an expansile and multilocular radiolucent lesion in the posterior mandible. Blood tests reveal elevated serum calcium. Which is the likely diagnosis?
- (A) Central giant cell granuloma
 - (B) Brown tumor of hyperparathyroidism
 - (C) Ameloblastoma
 - (D) Myxoma
29. A male patient presents with a painless ulcerated mass on the lower lip. Biopsy reveals basal cells with a palisading arrangement. What is the most likely diagnosis?
- (A) Basal cell carcinoma
 - (B) Squamous cell carcinoma
 - (C) Actinic keratosis
 - (D) Keratoacanthoma
30. A 45-year-old male presents with multiple keratotic papules on the palms, soles and oral cavity. What is the most likely syndrome?
- (A) Pachyonychia congenita
 - (B) Peutz-Jeghers syndrome
 - (C) Cowden syndrome
 - (D) Gorlin-Goltz syndrome
31. A histological slide of an oral lesion shows pseudoepitheliomatous hyperplasia and microabscesses containing fungal hyphae. What is the most likely diagnosis?
- (A) Histoplasmosis
 - (B) Actinomycosis
 - (C) Candidiasis
 - (D) Blastomycosis
32. "Strawberry gingivitis" is a clinical feature of
- (A) Wegener's granulomatosis
 - (B) Pemphigus vulgaris
 - (C) Lichen planus
 - (D) Erythema multiforme

33. The "satellite phenomenon" is a characteristic of
(A) *Haemophilus influenzae*
(B) *Candida albicans*
(C) *Mycobacterium tuberculosis*
(D) *Corynebacterium diphtheriae*
34. Which microorganism is commonly involved in peri-implantitis?
(A) *Porphyromonas gingivalis*
(B) *Streptococcus mutans*
(C) *Candida albicans*
(D) *Actinomyces israelii*
35. What is the purpose of embedding in histotechniques?
(A) Staining tissues
(B) Sectioning tissues
(C) Hardening tissues for cutting
(D) Fixing tissues
36. Which type of microscopy allows the observation of living cells without staining?
(A) Brightfield microscopy
(B) Phasecontrast microscopy
(C) Fluorescence microscopy
(D) Electron microscopy
37. A 45-year-old patient presents with a tissue biopsy from an ulcerated lesion on the tongue. The tissue is fixed in 10% formalin. What is the primary purpose of formalin in histology?
(A) Dehydration of tissue
(B) Embedding of tissue
(C) Preservation of tissue morphology
(D) Staining of tissue
38. A biopsy sample reveals glycogen-rich cells. PAS staining is recommended. What color will the glycogen appear under the microscope after PAS staining?
(A) Blue
(B) Pink
(C) Magenta
(D) Yellow
39. An oral candidiasis smear is evaluated using Gram stain. What is the Gram reaction of *Candida albicans*?
(A) Gram-positive
(B) Gram-negative
(C) Acid-fast
(D) Neutral staining

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40. A biopsy from a suspected melanoma shows pigmented cells. What special stain can confirm melanin in these cells?
- (A) Masson-Fontana (B) PAS stain
(C) Hematoxylin and Eosin (D) Alcian blue
41. A biopsy specimen of a suspected odontogenic tumor is processed and a pale eosinophilic matrix is observed. Which staining technique would differentiate collagen from other structures?
- (A) Masson's trichrome (B) PAS stain
(C) Giemsa stain (D) Congo red
42. Merkel cells in the oral epithelium are primarily associated with
- (A) Immune function (B) Sensory perception
(C) Pigment production (D) Structural support
43. Tonofilaments in the oral epithelium are primarily composed of which protein?
- (A) Actin (B) Collagen
(C) Keratin (D) Elastin
44. The primary role of adherens junctions in epithelial tissues is to
- (A) Form impermeable seals between cells
(B) Allow communication between cells
(C) Link actin cytoskeletons of adjacent cells
(D) Anchor cells to the extracellular matrix
45. Which of the following is a characteristic feature of gap junctions?
- (A) Zonula adherens
(B) Connexons forming channels
(C) Presence of keratin filaments
(D) Actin filament attachment
46. Which cyclin is primarily active during the G1 phase of the cell cycle?
- (A) Cyclin A (B) Cyclin B
(C) Cyclin D (D) Cyclin E

47. The protein p53 plays a critical role in the cell cycle by
(A) Promoting cell division
(B) Inhibiting apoptosis
 (C) Inducing cell cycle arrest in response to DNA damage
(D) Activating CDKs directly
48. Which protein is known as the “guardian of the genome”?
(A) Rb (Retinoblastoma protein) (B) p21
 (C) p53 (D) Cyclin D
49. Retinoblastoma protein (Rb) regulates the cell cycle by
(A) Activating CDKs
 (B) Binding and inhibiting E2F transcription factors
(C) Inducing cyclin degradation
(D) Promoting the G2/M transition
50. A mutation in which of the following genes is most likely to result in uncontrolled cell proliferation?
(A) Cyclin B
 (B) CDK inhibitor p27
(C) Tumor suppressor p53
(D) Cyclin-dependent kinase 4
51. What structure in skeletal muscle is responsible for separating sarcomeres?
(A) M line (B) Z disc
(C) A band (D) I band
52. In wound healing, the maturation phase is primarily associated with
 (A) Replacement of granulation tissue with scar tissue
(B) Migration of keratinocytes to cover the wound
(C) Clot formation and hemostasis
(D) Release of growth factors
53. What is the purpose of gel electrophoresis in molecular biology?
(A) To amplify DNA sequences
 (B) To separate nucleic acids or proteins based on size
(C) To sequence DNA
(D) To clone DNA into a plasmid

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54. In Southern blotting, which type of molecule is detected?
(A) RNA (B) DNA
(C) Protein (D) Lipids
55. CRISPR-Cas9 is a technique primarily used for
(A) Amplifying DNA (B) Editing genes
(C) Measuring protein levels (D) Detecting RNA
56. The Sanger sequencing method uses which key component to terminate DNA synthesis?
(A) Reverse transcriptase
(B) Deoxynucleotide triphosphates (dNTPs)
(C) Dideoxynucleotide triphosphates (ddNTPs)
(D) DNA ligase
57. Which of the following is a cloning vector commonly used in molecular biology?
(A) Polymerase (B) Plasmid
(C) Restriction enzyme (D) RNA primer
58. The region of DNA that signals the start of transcription is called the
(A) Promoter (B) Enhancer
(C) Terminator (D) Operator
59. Which of the following is the characteristic of a myeloblast?
(A) Large nucleus with fine chromatin
(B) Nucleus with coarse chromatin
(C) Presence of granules in the cytoplasm
(D) Absence of a nucleus
60. The ability of cells to sense and respond to the mechanical properties of the ECM such as stiffness is known as
(A) Matrix remodelling (B) Mechanotransduction
(C) Signal transduction (D) Cell-cell adhesion
61. The primary role of the nucleolus within the nucleus is to
(A) Package proteins
(B) Synthesize ribosomal RNA (rRNA)
(C) Break down cellular waste
(D) Transcribe mRNA

62. Which of the following bacteria is characterized by a gram-positive and a catalase-positive cocci with a golden yellow pigmentation, often associated with skin and soft tissue infections?
- (A) *Streptococcus pyogenes* (B) *Staphylococcus aureus*
(C) *Corynebacterium diphtheria* (D) *Enterococcus faecalis*
63. Which type of hemolysis is observed in *Streptococcus pyogenes* on blood agar?
- (A) Alpha hemolysis (B) Beta hemolysis
(C) Gamma hemolysis (D) No hemolysis
64. What is the characteristic morphology of *Corynebacterium diphtheriae*?
- (A) Gram-negative diplococci
(B) Gram-positive bacilli in V or L shapes
(C) Gram-positive cocci in clusters
(D) Gram-negative rods in chains
65. Which of the following is used to transport clinical specimens suspected of containing *Neisseria gonorrhoeae*?
- (A) Amies transport medium
(B) Stuart transport medium
(C) Sabouraud agar
(D) Lowenstein-Jensen medium
66. Which antibiotic resistance mechanism is associated with *Staphylococcus aureus* strains resistant to methicillin (MRSA)?
- (A) Beta-lactamase production
(B) Modification of penicillin-binding proteins (PBPs)
(C) Increased efflux pump activity
(D) Alteration of ribosomal binding sites
67. Which of the following describes the mechanism by which *Mycobacterium tuberculosis* becomes resistant to certain antibiotics?
- (A) Production of beta-lactamase
(B) Modification of the bacterial cell wall
(C) Expression of efflux pumps
(D) Mutation in RNA polymerase

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68. Which of the following best describes the significance of *Clostridium tetani* in human disease?
- (A) It produces a toxin that causes spastic paralysis
 - (B) It forms endospores that contribute to food poisoning
 - (C) It causes a localized infection with abscess formation
 - (D) It produces enterotoxins responsible for diarrhea
69. Which of the following viruses causes the disease known as "fifth disease"?
- (A) Varicella zoster virus
 - (B) Parvovirus B19
 - (C) Epstein Barr virus
 - (D) Cytomegalovirus
70. Which of the following bacteria is commonly associated with hospital-acquired pneumonia (HAP)?
- (A) *Streptococcus pneumoniae*
 - (B) *Escherichia coli*
 - (C) *Pseudomonas aeruginosa*
 - (D) *Clostridium botulinum*
71. Which enzyme is the terminal oxidase in the mitochondrial electron transport chain?
- (A) Cytochrome c oxidase
 - (B) Succinate dehydrogenase
 - (C) ATP synthase
 - (D) NADH dehydrogenase
72. The major product of glycogen breakdown in muscle is
- (A) Glucose
 - (B) Glucose 1-phosphate
 - (C) Fructose 6-phosphate
 - (D) Lactate
73. Which molecule is the primary electron donor in oxidative phosphorylation?
- (A) NAD⁺
 - (B) NADH
 - (C) ATP
 - (D) FADH₂
74. Which amino acid serves as a precursor for serotonin synthesis?
- (A) Tryptophan
 - (B) Tyrosine
 - (C) Phenylalanine
 - (D) Glutamate
75. What is the function of ethidium bromide in gel electrophoresis?
- (A) To visualize proteins
 - (B) To bind DNA and fluoresce under UV light
 - (C) To stain lipids
 - (D) To improve separation efficiency

76. What is the main pathological consequence of thrombosis?
(A) Increased tissue oxygenation (B) Ischemia
(C) Vasodilation (D) Hyperplasia
77. Which type of shock is characterised by a sudden loss of vascular tone, leading to severe hypotension?
(A) Cardiogenic shock (B) Neurogenic shock
(C) Hypovolemic shock (D) Septic shock
78. Which enzyme plays a key role in fibrinolysis to resolve a thrombus?
(A) Thrombin (B) Plasmin
(C) Factor VIII (D) Factor XII
79. Which type of necrosis is most commonly associated with ischemic injury?
(A) Coagulative necrosis (B) Liquefactive necrosis
(C) Fat necrosis (D) Caseous necrosis
80. Which condition is a direct result of hemorrhage exceeding compensatory mechanisms?
(A) Shock (B) Edema
(C) Hemolysis (D) Hypercoagulability
81. What is the molecular mechanism underlying the action of oncogenes in carcinogenesis?
(A) Promotion of apoptosis
(B) Inhibition of DNA repair
(C) Stimulation of uncontrolled cell proliferation
(D) Activation of immune responses
82. During bacterial growth, the phase where cells are metabolically active but not dividing is called
(A) Lag phase (B) Log phase
(C) Stationary phase (D) Death phase
83. Transformation in bacteria involves
(A) Transfer of DNA via bacteriophages
(B) Uptake of free DNA from the environment
(C) DNA transfer through pili
(D) Random mutation of the genome

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84. Which microorganism is known for its facultative intracellular growth?
(A) *Escherichia coli* (B) *Salmonella typhi*
(C) *Staphylococcus aureus* (D) *Clostridium botulinum*
85. Which bacterial genetic element is most commonly associated with multidrug resistance in hospitals?
(A) Transposons (B) Integrons
(C) Chromosomal mutations (D) Plasmids
86. Which of the following best describes the role of helper T cells (T_h cells) in adaptive immunity?
(A) Directly kill infected cells
(B) Recognize antigens via MHC I molecules
(C) Activate cytotoxic T cells (CTLs)
(D) Stimulate B cells to produce antibodies
87. In the context of cell-mediated immunity, which cytokine is primarily involved in activating cytotoxic T cells?
(A) Interleukin-4 (IL-4) (B) Interferon-gamma (IFN- γ)
(C) Interleukin-2 (IL-2) (D) Tumor necrosis factor-alpha (TNF- α)
88. The molecular basis for autoimmunity involves
(A) Failure of immune cells to recognize self-antigens as foreign
(B) A defect in the complement system
(C) Overproduction of antibodies against microbial antigens
(D) Increased production of pro-inflammatory cytokines
89. Which of the following is a hallmark feature of the "Graft-versus-Host" (GVH) reaction?
(A) Immune cells from the graft attack the recipient's tissues
(B) The recipient's immune cells attack the graft
(C) The graft is rejected immediately after transplantation
(D) Antibody-mediated rejection of the graft
90. In the context of tumor immunity, which of the following is a common mechanism of immune evasion by tumors?
(A) Expression of tumor antigens recognized by cytotoxic T cells
(B) Secretion of cytokines that activate T cells
(C) Downregulation of MHC class I molecules
(D) Enhancement of natural killer (NK) cell activity

91. Which of the following is the mechanism by which monoclonal antibodies are often used in cancer immunotherapy?
- (A) Blocking immune checkpoints to enhance T cell activity
 - (B) Directly killing tumor cells by inducing apoptosis
 - (C) Neutralizing cytokines that promote tumor growth
 - (D) Inhibiting the expression of MHC molecules on tumor cells
92. Taurodontism is usually seen in
- (A) Mesiodens
 - (B) Canine with extra cusp
 - (C) Mandibular first molar
 - (D) Maxillary 1st premolar
93. Fordyce's spots are
- (A) Ectopic sebaceous glands
 - (B) Black spots
 - (C) Present on the tongue only
 - (D) Minor salivary glands
94. Which compound is detected by Feulgen's staining?
- (A) RNA
 - (B) DNA
 - (C) Carbohydrates
 - (D) Glutamines
95. What is the primary mechanism by which oncogenic viruses contribute to cancer development?
- (A) Direct destruction of host cells
 - (B) Integration of viral DNA into the host genome, disrupting normal cell regulation
 - (C) Induction of chronic inflammation and immune response
 - (D) Activation of apoptosis pathways
96. Epstein-Barr Virus (EBV) is associated with which of the following cancers?
- (A) Hepatocellular carcinoma
 - (B) Glioblastoma
 - (C) Non-small cell lung cancer
 - (D) Burkitt lymphoma
97. Which of the following is a characteristic feature of Treacher Collins syndrome?
- (A) Cleft palate
 - (B) Hyperdontia
 - (C) Hypertelorism and hearing loss
 - (D) Micrognathia and downward slanting eyes

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98. What is the primary purpose of using recombinant DNA technology in cell culture?
- (A) To isolate mitochondria from cells
 - (B) To amplify specific DNA sequences
 - (C) To produce proteins or other biological products
 - (D) To enhance cell membrane integrity
99. What is the main advantage of confocal microscopy over traditional light microscopy?
- (A) Visualization of 3D structures in samples
 - (B) Higher magnification power
 - (C) Lower cost and simpler operation
 - (D) Ability to observe live samples
100. Which of the following is used for staining lipids and triglycerides?
- (A) Alcian blue
 - (B) Periodic Acid-Schiff (PAS)
 - (C) Sudan III
 - (D) Prussian blue
101. In spectrophotometry, the absorbance of a solution is directly proportional to
- (A) The concentration of the solute
 - (B) The pH of the solution
 - (C) The voltage applied
 - (D) The molecular weight of the solute
102. Which part of the autonomic nervous system stimulates the secretion of saliva?
- (A) Sympathetic nervous system
 - (B) Parasympathetic nervous system
 - (C) Enteric nervous system
 - (D) Somatic nervous system
103. Which type of pain is typically associated with damage or injury to tissue?
- (A) Neuropathic pain
 - (B) Nociceptive pain
 - (C) Psychogenic pain
 - (D) Referred pain

104. What is the function of the Signal Recognition Particle (SRP) in protein synthesis?
- (A) It facilitates the splicing of introns in mRNA.
 - (B) It directs ribosomes to the endoplasmic reticulum for translation of membrane or secretory proteins.
 - (C) It assists in the unwinding of DNA during replication.
 - (D) It transports amino acids to the ribosome during translation.
105. Which mode of inheritance is characterized by males being more frequently affected and no male-to-male transmission?
- (A) Autosomal recessive
 - (B) X-linked dominant
 - (C) X-linked recessive
 - (D) Mitochondrial inheritance
106. In mitochondrial inheritance, the genetic material is inherited
- (A) Equally from both parents
 - (B) Only from the father
 - (C) Only from the mother
 - (D) Randomly from either parent
107. Which of the following therapies enhances tumor immunity by blocking immune checkpoint pathways?
- (A) CAR-T cell therapy
 - (B) Immune checkpoint inhibitors (e.g., anti-PD-1, anti-CTLA-4)
 - (C) Cancer vaccines
 - (D) Oncolytic viruses
108. Which syndrome is associated with polydactyly, hypodontia and cleft lip/palate?
- (A) Ellis-van Creveld syndrome
 - (B) Apert syndrome
 - (C) Treacher Collins syndrome
 - (D) Marfan syndrome
109. Which theory of mineralization suggests that mineral deposition occurs due to the presence of a framework or organic matrix that facilitates the deposition of hydroxyapatite crystals?
- (A) Nucleation theory
 - (B) Matrix vesicle theory
 - (C) Epitaxial theory
 - (D) Alkaline phosphatase theory

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110. The matrix vesicle theory of mineralization is primarily associated with
- (A) The initiation of crystal formation within small extracellular vesicles.
 - (B) The action of alkaline phosphatase in degrading inhibitors of mineralization.
 - (C) The direct deposition of calcium and phosphate ions on collagen fibers.
 - (D) The role of systemic hormones in regulating mineral deposition.
111. The use of bacteria to clean up oil spills is an example of
- (A) Biodegradation
 - (B) Bioremediation
 - (C) Biosynthesis
 - (D) Biomagnification
112. Which microorganism is used in the production of vitamin B12?
- (A) *Propionibacterium shermanii*
 - (B) *Escherichia coli*
 - (C) *Penicillium notatum*
 - (D) *Bacillus subtilis*
113. The Ames test is used to detect
- (A) Antibiotic sensitivity
 - (B) Mutagenicity of compounds
 - (C) Bacterial identification
 - (D) Viral replication rates
114. In wastewater treatment, microorganisms in the activated sludge process primarily perform which function?
- (A) Removing heavy metals
 - (B) Breaking down organic matter
 - (C) Neutralizing pH
 - (D) Producing methane gas
115. What is the most common site of a giant cell tumor of bone?
- (A) Spine
 - (B) Long bones of the hands
 - (C) Skull
 - (D) Distal femur
116. A hypothesis that states there is no relationship between two variables is known as
- (A) Directional hypothesis
 - (B) Null hypothesis
 - (C) Alternative hypothesis
 - (D) Causal hypothesis

117. Which of the following is a characteristic of experimental research?
- (A) Manipulation of variables
 - (B) Observational approach
 - (C) Retrospective analysis
 - (D) Theoretical synthesis
118. A case-control study is most appropriate for which type of research question?
- (A) Determining the incidence of a condition
 - (B) Exploring the cause of a rare disease
 - (C) Evaluating the effectiveness of a treatment
 - (D) Testing a new diagnostic tool
119. The dependent variable in a study is
- (A) The variable manipulated by the researcher
 - (B) The outcome variable that is measured
 - (C) The constant in the experiment
 - (D) The variable that is always categorical
120. Which type of bias occurs when participants alter their behavior because they know they are being studied?
- (A) Recall bias
 - (B) Selection bias
 - (C) Hawthorne effect
 - (D) Confounding bias
121. In a normal distribution, approximately what percentage of data falls within one standard deviation of the mean?
- (A) 50%
 - (B) 68%
 - (C) 75%
 - (D) 95%
122. Which statistical test is appropriate for comparing the means of two independent groups?
- (A) Chi-square test
 - (B) Paired t-test
 - (C) Independent t-test
 - (D) ANOVA
123. What is the main purpose of a Kaplan-Meier curve?
- (A) To measure central tendency
 - (B) To estimate survival probabilities over time
 - (C) To compare the means of groups
 - (D) To assess correlation between variables

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124. Which of the following is the main difference between immunofluorescence (IF) and immunohistochemistry (IHC)?
- (A) IF uses enzymes while IHC uses fluorescent dyes
 - (B) IF uses fluorescent dyes while IHC uses enzymes like horseradish peroxidase**
 - (C) IF is used for DNA analysis while IHC is used for protein analysis
 - (D) There is no difference between the two techniques
125. In immunofluorescence, which type of antibody is typically used to detect the primary antigen?
- (A) Secondary antibody
 - (B) Monoclonal antibody
 - (C) Fluorescent-labeled primary antibody**
 - (D) Polyclonal antibody
126. In patients with hyperparathyroidism, which of the following is a common oral manifestation?
- (A) Enlarged tongue with fissures
 - (B) Loss of lamina dura around the teeth**
 - (C) Increased salivation
 - (D) Oral ulcers and lesions
127. Which of the following oral complications is often seen in patients with uncontrolled phenylketonuria (PKU)?
- (A) Enamel hypoplasia**
 - (B) Gingival bleeding
 - (C) Oral ulcers
 - (D) Oral pigmentation
128. The most common initial symptoms of HIV infection are generally seen during which phase?
- (A) Acute retroviral syndrome**
 - (B) Chronic asymptomatic phase
 - (C) AIDS-related complex (ARC)
 - (D) Opportunistic infections
129. Which genetic mutation is most frequently associated with inherited oral cancer syndromes?
- (A) BRCA1
 - (B) TP53**
 - (C) KRAS
 - (D) MYC
130. Which of the following genetic alterations is most commonly seen in the early stages of many cancers?
- (A) Point mutations in oncogenes**
 - (B) Loss of heterozygosity in tumor suppressor genes
 - (C) Gene amplifications of tumor suppressor genes
 - (D) Methylation of DNA repair genes

131. Which of the following is commonly used as a substrate in enzyme histochemistry to detect alkaline phosphatase activity?
- (A) DAB (3,3'-Diaminobenzidine)
 - (B) Nitro blue tetrazolium (NBT)
 - (C) Fast red TR salt
 - (D) Naphthol-AS phosphate**
132. Which of the following is a characteristic feature of Epidermolysis Bullosa, a common genodermatosis?
- (A) Persistent erythema on sun-exposed areas
 - (B) Fragile skin with blister formation after minor trauma**
 - (C) Thickened skin on the palms and soles
 - (D) Widespread scaling and ichthyosis
133. Which of the following structures is NOT derived from neural crest cells?
- (A) Melanocytes
 - (B) Schwann cells
 - (C) Adrenal medulla
 - (D) Skeletal muscles**
134. The correlation coefficient (r) ranges between
- (A) -1 and + 1**
 - (B) 0 and + 1
 - (C) 0 and infinity
 - (D) -2 and + 2
135. Which of the following is true about the principle of microarray technology?
- (A) It depends on hybridization of complementary DNA sequences.**
 - (B) It sequences DNA using fluorescently labeled nucleotides.
 - (C) It amplifies DNA using thermal cycling.
 - (D) It directly measures protein concentrations in cells.
136. The pharyngeal arch that contributes to the development of the maxilla and mandible is
- (A) First pharyngeal arch**
 - (B) Second pharyngeal arch
 - (C) Third pharyngeal arch
 - (D) Fourth pharyngeal arch
137. Which type of research is aimed at solving practical problems?
- (A) Pure research
 - (B) Basic research
 - (C) Applied research**
 - (D) Exploratory research

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138. Which of the following is an example of a proto-oncogene that when mutated, can promote cancer development?
- (A) BRCA1 (B) RAS
(C) TP53 (D) APC
139. Gap junctions allow direct communication between cells by permitting the passage of
- (A) Proteins (B) Nucleic acids
(C) Ions and small molecules (D) Large polysaccharides
140. Which type of cell junction provides a seal to prevent the leakage of molecules between cells?
- (A) Desmosomes
(B) Gap junctions
(C) Tight junctions
(D) Adherens junctions
141. A study collects data on smoking status (smoker or non-smoker). What type of variable is this?
- (A) Continuous (B) Categorical
(C) Ordinal (D) Interval
142. Which type of research focuses on understanding phenomena through subjective data?
- (A) Quantitative research
(B) Experimental research
(C) Qualitative research
(D) Descriptive research
143. Teratomas are tumors that arise from which type of cells?
- (A) Epithelial cells (B) Germ cells
(C) Mesenchymal cells (D) Neural crest cells
144. In which part of the cell does DNA replication occur?
- (A) Cytoplasm (B) Endoplasmic reticulum
(C) Mitochondria (D) Nucleus
145. The primary goal of a literature review is to
- (A) Collect data from existing studies
(B) Develop a theoretical framework
(C) Identify gaps in research
(D) Justify the need for your study

146. The measure of the consistency of a test over time is called as
(A) Validity (B) Internal reliability
(C) Test-retest reliability (D) Inter-rater reliability
147. Which type of sampling gives every member of a population an equal chance of being selected?
(A) Stratified sampling (B) Systematic sampling
(C) Random sampling (D) Snowball sampling
148. A research design where the same group is studied at different points in time is called as
(A) Cross-sectional (B) Longitudinal
(C) Experimental (D) Case study
149. The term "triangulation" in research refers to
(A) Collecting data from three sources
(B) Using multiple methods to validate findings
(C) Using three variables in an experiment
(D) Drawing conclusions from three data sets
150. What is the primary purpose of pilot testing?
(A) Ensure sample randomness
(B) Collect final data
(C) Identify potential issues in research design
(D) Test hypothesis
151. What is the role of mRNA in protein synthesis?
(A) Catalyze the formation of peptide bonds
(B) Deliver amino acids to ribosomes
(C) Serve as a template for assembling amino acids
(D) Stabilize the DNA double helix
152. A point mutation that results in a stop codon is called a
(A) Missense mutation (B) Nonsense mutation
(C) Silent mutation (D) Frameshift mutation
153. A mutation that inserts or deletes nucleotides in a DNA sequence is known as
(A) Point mutation (B) Silent mutation
(C) Frameshift mutation (D) Substitution mutation

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154. What is the main difference between eukaryotic and prokaryotic mRNA processing?
- (A) Eukaryotic mRNA is not processed.
 - (B) Prokaryotic mRNA undergoes splicing.
 - (C) Eukaryotic mRNA undergoes capping, splicing and polyadenylation.
 - (D) Prokaryotic mRNA has a 5' cap and poly-A tail.
155. Which mutation causes a single amino acid change in the resulting protein?
- (A) Silent mutation
 - (B) Frameshift mutation
 - (C) Nonsense mutation
 - (D) Missense mutation
156. Which enzyme is responsible for joining Okazaki fragments on the lagging strand during DNA replication?
- (A) DNA helicase
 - (B) DNA polymerase
 - (C) DNA ligase
 - (D) Primase
157. Induced pluripotent stem cells (iPSCs) are generated by
- (A) Isolating embryonic stem cells from a blastocyst
 - (B) Reprogramming adult somatic cells using specific transcription factors
 - (C) Differentiating multipotent stem cells into other types
 - (D) Fusing adult stem cells with embryonic stem cells
158. Which of the following is a key ethical concern in embryonic stem cell research?
- (A) High financial cost of research
 - (B) Use of adult cells in experimentation
 - (C) Destruction of embryos to obtain stem cells
 - (D) Risk of immune rejection
159. What is the significance of the transcription factors Oct4, Sox2, Klf4 and c-Myc in stem cell research?
- (A) They are involved in apoptosis regulation.
 - (B) They are used to induce pluripotency in adult cells.
 - (C) They are markers of hematopoietic stem cells.
 - (D) They are inhibitors of cell differentiation.

160. Mesenchymal Stem Cells (MSCs) are most commonly found in
- (A) Bone marrow
 - (B) Brain tissue
 - (C) Cardiac muscle
 - (D) Blood plasma
161. What is the main advantage of using autologous stem cells in therapy?
- (A) They are more potent than allogeneic stem cells.
 - (B) They avoid immune rejection and ethical concerns.
 - (C) They differentiate faster into target cells.
 - (D) They have longer shelf lives.
162. The process of differentiating stem cells into specific cell types for therapeutic purposes is known as
- (A) Transdifferentiation
 - (B) Multipotency activation
 - (C) Dedifferentiation
 - (D) Directed differentiation
163. What is the primary purpose of a museum in a scientific or educational setting?
- (A) To collect artifacts for resale
 - (B) To preserve, display and educate about historical and scientific materials
 - (C) To conduct experimental research
 - (D) To house administrative offices
164. Which type of lighting is most suitable for preserving artifacts in a museum?
- (A) Incandescent lighting
 - (B) Fluorescent lighting
 - (C) LED lighting with UV filters
 - (D) Natural sunlight
165. What is the recommended relative humidity range for most biological specimens in museums?
- (A) 10-20%
 - (B) 90-100%
 - (C) 60-80%
 - (D) 30-50%

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166. Proficiency testing in a laboratory is an example of
- (A) Internal quality control
 - (B) Random sampling
 - (C) Process validation
 - (D) External quality assessment**
167. Standard Operating Procedures (SOPs) are essential in quality control because they
- (A) Ensure consistency and reliability in processes**
 - (B) Allow for experimentation
 - (C) Focus on improving the profitability of the organization
 - (D) Remove the need for calibration
168. Which principle governs the ethical use of animals in research?
- (A) The 3Rs (Replacement, Reduction, Refinement)**
 - (B) The 5Cs (Compassion, Care, Cost, Control, Creativity)
 - (C) Absolute prohibition of animal use
 - (D) Maximum animal exposure in testing
169. The Institutional Animal Care and Use Committee (IACUC) is responsible for
- (A) Conducting experiments on animals
 - (B) Ensuring ethical and humane treatment of animals in research**
 - (C) Developing animal cloning techniques
 - (D) Performing surgeries on laboratory animals
170. Transgenic animal models are created by
- (A) Subjecting animals to prolonged radiation
 - (B) Using animals only for behavioral studies
 - (C) Feeding animals with chemically modified diets
 - (D) Introducing foreign DNA into the organism's genome**
171. In the context of dental ethics, what does the principle of 'Autonomy' refer to?
- (A) The dentist's right to make decisions
 - (B) The patient's right to self-determine and informed consent**
 - (C) The government's control over dental practices
 - (D) The dental assistant's role in treatment planning

172. What is the ethical obligation of a dentist when encountering a suspicious lesion during an examination?
- (A) Ignore it if the patient is asymptomatic
 - (B) Inform the patient and recommend further evaluation
 - (C) Wait until the next appointment to address it
 - (D) Refer the patient to a general physician
173. Which ethical principle emphasizes the dentist's duty to do no harm to the patient?
- (A) Beneficence
 - (B) Veracity
 - (C) Justice
 - (D) Non-maleficence
174. What is the dentist's responsibility regarding continuing education as per the Code of Ethics?
- (A) Optional, based on personal interest
 - (B) Mandatory to maintain and update professional knowledge and skills
 - (C) Required only when introducing new treatments
 - (D) Not addressed in the Code of Ethics
175. How should a dentist handle a situation when a patient refuses a recommended treatment?
- (A) Coerce the patient into accepting the treatment
 - (B) Respect the patient's decision and document the refusal
 - (C) Dismiss the patient from the practice
 - (D) Ignore the patient's wishes and proceed with treatment
176. Eastern blotting is primarily used for the detection of _____
- (A) RNA
 - (B) DNA
 - (C) Post-translational modifications of proteins
 - (D) Protein-DNA interactions
177. What type of membrane is commonly used in blotting techniques for transferring biomolecules?
- (A) Agarose gel
 - (B) Nitrocellulose or PVDF membrane
 - (C) Polyacrylamide gel
 - (D) Cellulose paper

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178. In autosomal recessive inheritance, what percentage of offspring is typically affected when both parents are carriers?
- (A) 25% (B) 50%
(C) 75% (D) 100%
179. Which inheritance pattern involves mitochondrial DNA?
- (A) Autosomal dominant
(B) Autosomal recessive
(C) X-linked
(D) Maternal inheritance
180. In incomplete dominance, the phenotype of the heterozygote is
- (A) Identical to the dominant allele
(B) A blend of the two alleles
(C) Identical to the recessive allele
(D) None of the above
181. Which of the following chromosomal abnormalities is associated with the cleft lip and palate?
- (A) Trisomy 21 (Down syndrome)
(B) Klinefelter syndrome
(C) Turner syndrome
(D) Trisomy 13 (Patau syndrome)
182. Oral manifestations like macroglossia and fissured tongue are seen in
- (A) Trisomy 21
(B) Turner syndrome
(C) Trisomy 18
(D) Fragile X syndrome
183. A karyotype of 47, XXY is a characteristic of
- (A) Down syndrome
(B) Turner syndrome
(C) Klinefelter syndrome
(D) Edwards syndrome

184. Which genetic anomaly is linked to amelogenesis imperfecta in the context of chromosomal changes?
- (A) Deletion in Xp22.3
 - (B) Trisomy 21
 - (C) Duplication in chromosome 15
 - (D) Translocation of chromosome 22
185. Which of the following is a single-gene disorder affecting oral tissues?
- (A) Osteogenesis imperfecta
 - (B) Trisomy 21
 - (C) Turner syndrome
 - (D) Patau syndrome
186. Cystic fibrosis is caused by mutations in which gene?
- (A) COL1A1
 - (B) FMR1
 - (C) HBB
 - (D) CFTR
187. What is the mode of inheritance for Marfan syndrome?
- (A) Autosomal dominant
 - (B) Autosomal recessive
 - (C) X-linked recessive
 - (D) X-linked dominant
188. Which of the following disorders is an example of a trinucleotide repeat expansion?
- (A) Marfan syndrome
 - (B) Sickle cell anemia
 - (C) Cystic fibrosis
 - (D) Huntington's disease
189. Which method is commonly used to break open cells during cell fractionation?
- (A) Electrophoresis
 - (B) Homogenization
 - (C) Ultracentrifugation
 - (D) Dialysis

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190. Which of the following components is typically collected first during differential centrifugation?
- (A) Mitochondria (B) Nucleus
(C) Ribosomes (D) Cytosol
191. In density gradient centrifugation, particles separate based on their
- (A) Electrical charge
(B) Molecular weight
(C) Sedimentation coefficient
(D) Thermal stability
192. What is the purpose of using a sucrose gradient in centrifugation?
- (A) To stabilize the rotor
(B) To generate a density gradient for particle separation
(C) To prevent contamination
(D) To increase centrifuge speed
193. Which molecule moves faster in gel electrophoresis?
- (A) Large, highly-charged molecules
(B) Small, neutral molecules
(C) Large, neutral molecules
(D) Small, highly-charged molecules
194. In 2D electrophoresis, proteins are separated by
- (A) Size and pH
(B) Charge and size
(C) Charge and molecular weight
(D) Molecular weight and hydrophobicity
195. Which of the following is a cutting-edge advancement in proteomics?
- (A) X-ray crystallography
(B) Mass spectrometry-based protein analysis
(C) Western blotting
(D) Paper chromatography

196. Organoids are used in research to mimic
- (A) Artificial intelligence systems
 - (B) Gel electrophoresis
 - (C) DNA folding
 - (D) Tissue architecture and function**
197. Lab-on-a-chip technology is primarily used for
- (A) Large-scale protein synthesis
 - (B) Miniaturized biochemical analyses**
 - (C) Organ transplant research
 - (D) RNA extraction
198. What is the primary application of flow cytometry?
- (A) DNA sequencing
 - (B) Protein separation
 - (C) Cell sorting and counting**
 - (D) Ultrafiltration
199. What does MALDI-TOF stand for in mass spectrometry?
- (A) Matrix-Assisted Laser Desorption/Ionization Time-of-Flight**
 - (B) Multi-Assisted Laser Displacement/Integration Time-of-Flight
 - (C) Molecular Assisted Liquid Diffusion/Isolation Time-of-Flight
 - (D) Matrix-Assisted Light Desorption/Integration Time-of-Flight
200. Cryo-EM (Cryo-Electron Microscopy) is widely used for studying
- (A) Protein structures at atomic resolution**
 - (B) Cell membrane composition
 - (C) RNA transcription
 - (D) Microbial cultures
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SPACE FOR ROUGH WORK

