S/SO/2013/13
BIOTECHNOLOGY

Roll No.						BOOKLET NO.	13547

Candidate should write his/her Roll No. in the box above.

Total No. of Questions : **150**

Time : **2** Hours]	No. of Printed Pages : **32**	[Total Marks : **300**

INSTRUCTIONS FOR CANDIDATES

1. *All* questions are compulsory.
2. *All* questions carry equal marks.
3. The question paper contains **150** questions. The examinee should verify that the requisite number of questions are printed in the question paper, otherwise he should ask for another question paper.
4. The cover page indicates the number of printed pages in the question paper. The examinee should verify that the requisite number of pages are attached in the question paper, otherwise he should ask for another question paper.
5. Read carefully the instructions given on the answer sheet supplied and indicate your answers accordingly.
6. Kindly make necessary entries on the answer sheet only at the places indicated and nowhere else.
7. Examinees should specially pay attention that 2 marks will be awarded for correct answer.
8. Examinees should do all rough work on the space meant for rough work on the last page of the question paper and nowhere else, not even on the answer sheet.

1. Cell theory was given by :

(A) Kleinfelter (B) Schleiden and Schwann

(C) Waldayer (D) Singer and Nicholson

2. Mitochondria are missing in :

(A) Plant cells (B) Animal cells

(C) Bacteria (D) All of these

3. Nucleoid is found in :

(A) Algal cells (B) Bacterial cells

(C) Fungal cells (D) Fern cells

4. Plasma membrane is :

(A) Proteinaceous and living

(B) Lipoproteinaceous and non-living

(C) Cellulosic and living

(D) Lipoproteinaceous and living

5. NOR is responsible for :

(A) Nucleic acid synthesis (B) Nucleolar organization

(C) Nuclear rearrangement (D) Chromatin thread formati

6. RNA synthesis is done by :

(A) Chromatin thread (B) Karyolymph

(C) Nucleolus (D) Microbodies

7. Site for protein synthesis is :

(A) Lysosome (B) Smooth endoplasmic reticulum

(C) Ribosomes (D) Mitochondria

8. Active transport involves :

(A) ATP (B) RNA

(C) DNA (D) None of these

9. Phragmoplast type of cell division is found in :

(A) Bacteria (B) Animal cells

(C) Plant cells (D) Cyanobacteria

10. Interferons are the defence molecules against :

(A) Diabetes (B) Blood pressure

(C) Viral disease (D) Renal failure

11. Formation of polypeptide chain is :

(A) Transcription (B) Reverse transcription

(C) Translation (D) RNA interference

12. During transcription, messenger RNA contains :

(A) Introns (B) Interferons

(C) Exons (D) None of these

13. Amplification of gene can be done by :

(A) Gel electrophoresis (B) Chromatography

(C) Rt-PCR (D) HPLC method

14. AIDS is :

(A) Bacterial contamination (B) Virally transmitted

(C) Inheritable (D) None of these

15. Phosphodiester bonds are found in :

(A) Nucleosides (B) Disaccharides

(C) Mercaptans (D) Nucleotides

16. Feulgen reaction is used to test :

(A) Proteins (B) Lipids

(C) Carbohydrates (D) Nucleic acid

17. Chi-square test is used for :

(A) Standard deviation (B) Goodness of fit

(C) Correlation (D) None of these

18. Replication of DNA takes place during :

(A) Prophase (B) Telophase

(C) Interphase (D) Metaphase

19. DNA ligase helps in the :

(A) Process of translation (B) Joining of DNA strands

(C) Joining of Okazaki fragments (D) Synthesis of ATP

20. Operon model was proposed to explain :

(A) Eukaryotic transcription (B) Prokaryotic transcription

(C) DNA replication (D) All of these

21. Gene-battery model for eukaryotes was given by :

(A) Taylor (B) Britten and Davidson

(C) Harshey and Chase (D) Kleinfelter

22. Which is a marker gene ?

(A) GUG (B) Luciferase gene

(C) GUS gene (D) Both (B) and (C)

23. Reverse transcription in RNA viruses was given by :

(A) Griffith (B) Temin

(C) Wilkins (D) H. G. Khorana

24. Initiation codon is :

(A) GUG and CAT (B) AUG and GUG

(C) ATC and AUG (D) GAG and ATG

25. Clover leaf model was given for :

(A) *m*-RNA (B) Operon model

(C) *t*-RNA (D) *r*-RNA

26. First amino acid to initiate translation is :

(A) Biotin (B) Leucin

(C) Methionine (D) None of these

27. Functional component of gene is called :

(A) Recon (B) Muton

(C) Intron (D) Cistron

28. The best tool for studying molecular diversity is :

(A) RFLP (B) RAPD

(C) SNP (D) All of these

29. PUC stands for :

(A) Prevention of uridin :

(B) Plasmid developed at University of California

(C) An oil bug

(D) Pneumonia virus

30. Taq DNA polymerase is :

(A) Fragile (B) Thermosensitive

(C) Thermostable (D) Chemofragile

31. By submarine gel electrophoresis, DNA fragments are isolated by virtue of :

(A) Molecular weight (B) Equivalent weight

(C) Molecular size (D) Source of gene isolation

32. EDTA normally dissolves at a pH of :

(A) 7.4 (B) 8.0

(C) 8.4 (D) 7.0

33. Which of the following statements regarding to a double helical DNA molecule is *true* ?

(A) All hydroxyl groups of pentoses are involved in linkages

(B) Bases are perpendicular to the axis

(C) Each strand is identical

(D) Each strand replicates itself

34. Polymorphism is best defined as :

(A) Co-segregation of alleles

(B) One phenotype, multiple genotypes

(C) Non-random allele association

(D) One locus, multiple normal alleles

35. After UV damage of DNA in skin :

(A) A specific excinuclease detects damaged areas

(B) Purine dimers are formed

(C) Both strands are cleaved

(D) Endonuclease removed the strand

36. Which of the following descriptions of DNA replication is *not* common to the synthesis of both leading and lagging strands ?

(A) RNA primer is synthesized

(B) DNA polymerase III synthesizes DNA

(C) Helicase (rep protein) continuously unwinds duplex DNA at the replication fork during synthesis

(D) DNA ligase repeatedly joins the ends of DNA along the growing strand

37. Which of the following statements describing restriction endonucleases is *true* ?

(A) They always yield overhanging single stranded ends

(B) They recognize methylated DNA sequences

(C) They cleave both strands in duplex DNA

(D) They always yield blunt ends

38. Which of the following enzymes can polymerize deoxyribonucleotides into DNA ?

(A) Primase (B) DNA ligase

(C) RNA polymerase III (D) Reverse transcriptase

39. The Singer model of plasma membrane differs from the Robertson's model in the :

(A) Number of lipid layers

(B) Arrangement of lipid layers

(C) Arrangement of proteins

(D) Absence of proteins in Singer model

40. Which of the following molecules are found in a nucleoside ?

(A) A pyrophosphate group

(B) A 1' base linked to a pentose sugar

(C) A 5' phosphate group linked to pentose sugar

(D) A 3' phosphate group linked to pentose sugar

41. Which of the following enzymes can be described as a DNA dependent RNA polymerase ?

(A) DNA ligase (B) Primase

(C) DNA polymerase III (D) Reverse transcriptase

42. Which one is *not* a disaccharide sugar ?

(A) Maltose (B) Sucrose

(C) Fructose (D) Lactose

43. A promoter site on DNA :

(A) Transcribes repressor (B) Initiates transcription

(C) Codes for RNA polymerase (D) Regulates termination

44. The consensus sequence 5'TATAAAA3' found in eukaryotic genes is quite similar to a consensus sequence observed in prokaryotes. It is important as the :

(A) Only site of binding of RNA polymerase III

(B) Promoter for all RNA polymerases

(C) Termination site for RNA polymerase II

(D) First site of binding of a transcription factor for RNA polymerase II

45. Which one of the following binds to specific nucleotide sequences that are upstream of the start site of transcription ?

(A) RNA polymerase (B) Primase

(C) Helicase (D) Histone protein

46. New proteins destined for secretion are synthesized in the :

(A) Golgi apparatus (B) Smooth endoplasmic reticulum

(C) Free polysomes (D) Rough endoplasmic reticulum

47. How many high energy phosphate bond equivalents are utilized in the process of amino acid activation for protein synthesis ?

(A) Zero (B) One

(C) Two (D) Three

48. An inhibitor of protein synthesis that acts as an analogue of amino acyl *t*RNA is :

(A) Mitomycin-C (B) Streptomycin

(C) Nalidixic acid (D) Puromycin

49. Uptake by a recipient cell of soluble DNA released from a donor cell is defined as :

(A) Conjugation (B) Recombination

(C) Competence (D) Transformation

50. Direct transfer of a plasmid between two bacteria is defined as :

(A) Conjugation (B) Recombination

(C) Competence (D) Transformation

51. Bacterial lipopolysaccharide (LPS) is characterised by :

(A) Phospholipid (B) Ribitol teichoic acid

(C) Glycolipids (waxes) (D) Ketodeoxyoctonate

52. One of the most remarkable aspects of human immune system is its diversity i.e. the ability to recognize wide range of antigens and to mount a specific antibody response. This is called clonal selection. At cellular level, which is responsible for such specificity ?

(A) Cytotoxic T cells

(B) Lymphocytes

(C) Major histocompatibility complex

(D) Specific T cell receptors

53. Which best describes acquired immunity ?

(A) Increase in C-reactive protein (CRP)

(B) Presence of natural killer (NK) cells

(C) Complement cascade

(D) Maternal transfer of antibody

54. Which of the following statements best describes haptens ?

(A) They activate T cells

(B) Penicillin is a hapten

(C) Haptens do not react with specific antibody

(D) Haptens bind the major histocompatibility complex (MHC)

55. Major role of T cells in the immune response includes :

(A) Recognition of epitopes on all surfaces

(B) Complement fixation

(C) Phagocytosis

(D) Production of antibodies

56. Which immunoglobulin is initially seen on the primary response ? It is present as monomer on B cell surface but as a pentamer in serum :

(A) IgG (B) IgM

(C) IgE (D) IgA

57. Which immunoglobulin is primary antibody in saliva, tears and intestinal and genital secretions ?

(A) IgG (B) IgM

(C) IgE (D) IgA

58. A xenograft is best described as :

(A) Transplant from one region of a person to another

(B) Transplant from one person to genetically identical person

(C) Transplant from one species to the same species

(D) Transplant from one species to another species

59. An idiotype is characterized by :

(A) Determinant exposed after papain cleavage to an $F(ab')_2$ fragment

(B) Determinant from one clone of cells and probably located close to the antigen binding site of immunoglobulin

(C) Determinant inherited in Mendelian manner and recognized by cross immunization of individuals in a species

(D) Heavy chain determinant recognized by heterologous antisera

60. Penicillin is commercially produced from :

(A) *Penicillium chrysogenum* (B) *Penicillium notatum*

(C) *Penicillium griesus* (D) *Penicillium wentii*

61. The proteases used in detergent industry are :

(A) Acid proteases (B) Neutral proteases

(C) Alkaline proteases (D) None of these

62. An enzyme that catalyzes the reaction A $\rightleftharpoons$ B changes the :

(A) Heat of reaction

(B) Equilibrium constant

(C) Rate of forward and reverse reactions

(D) Entropy of the reaction

63. Diacylglycerol activates which of the following enzymes ?

(A) Protein kinase A (B) Protein kinase C

(C) MAP kinase (D) Tyrosine kinase

64. Cellular proteins destined for secretion are packaged and sorted in :

(A) Lysosomes (B) Endosomes

(C) Transgolgi network (D) Endoplasmic reticulum

65. Which process leads to the formation of polytene chromosomes ?

(A) Repeated replication without separation of chromatids

(B) Recombination between adjacent chromosome segments

(C) Sister chromatid exchange

(D) Non-disjunction of chromatids during meiosis

66. In animals, the enzyme unique to gluconeogenesis is :

(A) Enolase (B) Phosphoglyceromutase

(C) Fructose 1, 6, bisphosphatase (D) Aldolase

67. Which of the following *does not* make direct use of pH or proton gradient ?

(A) Mitochondria (B) Chloroplast

(C) Bacterial flagellum (D) Protozoan flagellum

68. Deletion or addition of a nitrogenous base in the reading frame leads into :

(A) Switches (B) Inversion

(C) Frame shift (D) Translocation

69. Nucleosome is an :

(A) Oligonucleotide

(B) Octamer of non-histones

(C) Euchromatic region with poor heterochromatin

(D) Octamer of histones complexed with DNA

70. Stationary phase in TLC is :

(A) Whatman Paper I (B) Silica gel

(C) Lipid layer (D) Phenol and ether

71. X-ray crystallography was used to determine :

(A) 3D structure of plasma membrane

(B) Double helix of DNA

(C) Structure of pigments

(D) None of the above

72. Barbara McClintock is credited for :

(A) Solanoid model

(B) Iron alum acetocarmine method

(C) Transformation

(D) Jumping genes

73. Isolated DNA can be studied quantitatively by :

(A) Gel electrophoresis (B) UV-VIS spectrophotometry

(C) Column chromatography (D) PCR

74. Which is the most effective mutagen ?

(A) Ionizing radiations (B) Colchicine

(C) Infrared rays (D) Maleic hydrazide

75. Which is a prokaryote ?

(A) Vibrio (B) Nostoc

(C) Pseudomonas (D) All of these

76. Most resistant structure in bacterium is :

(A) Proteinaceous cell-wall (B) Nucleoid

(C) Endospore (D) Plasmid

77. Agarophytes are the members of :

(A) Freshwater algae (B) Slime molds

(C) Marine water algae (D) Ferns

78. Which of the following is a biocontrol agent ?

(A) Cephaleuros (B) Trichoderma

(C) Rhizobium (D) Nematodes

79. Bacterial transformation was demonstrated by Griffith using :

(A) Lectobacillus (B) Streptococcus

(C) Diplococcus (D) Vibrio

80. An undifferentiated mass of cell is called :

(A) Axillary bud (B) Embryoids

(C) Callus (D) Implant

81. Cryopreservation is commonly done by using :

(A) Chilled ethanol (B) CNG

(C) Liquid N_2 (D) LPG

82. Laminar air flow receives air through :

(A) Microfilter (B) Silica filters

(C) HEPA filters (D) Synthetic filters

83. Best example of somatic clones is :

(A) Mulberry (B) Arabidopsis

(C) Sugarcane (D) Basmati rice

84. Gene gun is used to :

(A) Replicate genes (B) Mutate genes

(C) Transfer genes (D) Isolate genes

85. Tumour in roots can be developed by :

(A) Nitrosomonas (B) Ti-plasmids

(C) RNAi (D) Clostridium

86. Semen bank can be developed by preserving semen in :

(A) Formalin (B) Formalin Acetic Alcohol (FAA)

(C) 70% Alcohol (D) Liquid Nitrogen

87. Fermentation is :

(A) Aerobic process with low energy output

(B) Aerobic process with high energy output

(C) Anaerobic process with low energy output

(D) Anaerobic process with high energy output

88. Ozone depletion can be prevented by :

(A) Lowering the emission of CFC gases

(B) Preventing deforestation

(C) Reducing pollutants

(D) All of the above

89. Enzymes are basically :

(A) Metals (B) Polysaccharides

(C) Proteins (D) Thermoresistant

90. Optimum temperature for enzyme activity is :

(A) 0°—5°C (B) 20°—35°C

(C) 35°—60°C (D) 60° and above

91. Nitrocellulose membrane is used for :

(A) Electrophoresis (B) Chromatography

(C) Blotting (D) Spectrophotometry

92. For measuring length of DNA fragments upto 1000 bp. the suitable marker is :

(A) 100 bp ladder (B) Hind III λ

(C) Both (A) and (B) (D) None of these

93. Best ecofriendly feedstock for biofuel production is :

(A) *Jatropha* (B) *Zea mays*

(C) Algae (D) Sugarcane

94. Byproduct of sugarcane industries can be used for the production of :

(A) Pharmaceuticals (B) Menthol

(C) Ethanol (D) None of these

95. Transgenic crops are being criticized because of :

(A) Biodiversity loss

(B) Ethical reasons

(C) Suspected harm to human race

(D) All of the above

96. Photobioreactors are meant to :

(A) Grow algae

(B) Utilize CO_2 emission for photosynthesis

(C) Production of green energy feedstock

(D) All of the above

97. IPR issues are essential for :

(A) Biosafety (B) Environmental conservation

(C) Both of the above (D) None of these

98. Facultative saprophytes are basically :

(A) Saprophyte (B) Parasite

(C) Symbionts (D) None of these

99. Plant viruses usually contain :

(A) *ds*DNA (B) *ds*RNA

(C) *ss*DNA (D) *ss*RNA

100. Chimeric DNA is :

(A) A plasmid having multiple foreign DNA segments

(B) A cosmid with single foreign DNA segment

(C) *Zea mays* with variously coloured grains

(D) None of the above

101. Peptidoglycan and Teichoic acid are the components of cell wall in :

(A) Cyanobacteria (B) Trichoderma

(C) Pteridium (D) Bacteria

102. Pars amorpha, pars granulosa and pars nucleonema are the major parts of :

(A) Golgi bodies (B) Plasmalemma

(C) Chromatin (D) Nucleoli

103. Terminal oxidation occurs in :

(A) Grana lamella (B) Stroma

(C) F_1 particles (D) Quantasomes

104. During photosynthesis, oxygen is released by the process of :

(A) Cyclic photophosphorylation (B) Electron transport

(C) Photolysis of water (D) Reduction of NADP

105. Rate of photosynthesis is negligible in :

(A) Red light (B) Blue light

(C) Green light (D) Polychromatic light

106. Svedberg unit is associated with :

(A) Lysosome (B) Chromomeres

(C) Ribosomes (D) Nucleosome

107. Attachment of ribosomes to the membrane of endoplasmic reticulum is associated to :

(A) ATP and NAD (B) Fe^{+++} concentration

(C) Mg^{++} concentration (D) Ca^{++} concentration

108. Under anaerobic conditions, net output of ATP in glycolysis is :

(A) 8 (B) 2

(C) 36 (D) 10

109. Transposon is the segment of DNA responsible for :

(A) Homologous recombination

(B) Non-homologous recombination

(C) Amitosis

(D) Chromosomal non-disfunction

110. Centipede model of chromosome was proposed by :

(A) Ris (B) Taylor

(C) Roger and Kornberg (D) Godward

111. Mitochondria can be stained with :

(A) Acetocarmine (B) Geimsa

(C) Tanus green B (D) Basic fuchsin

112. Cell sap is the fluid present in :

(A) Mitochondria (B) Chloroplast

(C) Endoplasmic reticulum (D) Cell vacuole

113. Buffer solutions are :

(A) Usually acidic

(B) Usually basic

(C) Able to resist change in pH

(D) Unable to resist change in pH

114. Preventive vaccine by *r*DNA technique has been developed for :

(A) Malaria (B) Typhoid

(C) Hepatitis (D) Tuberculosis

115. ATP is a type of :

(A) Polysaccharide (B) Lipoprotein

(C) Nucleotide (D) Electron acceptor

116. SDS-PAGE is meant for the separation of :

(A) DNA (B) RNA

(C) Proteins (D) Lipids

117. Camera lucida is used for :

(A) Gel photography (B) Microphotography

(C) Phase contrast photography (D) Microscopic object drawings

118. Terminalization is the characteristic feature of :

(A) Pachytene (B) Diakinesis

(C) Leptotene (D) Zygotene

119. Tris base has the molecular formula :

(A) $C(H_2O)_n$ (B) $C_4H_{11}NO_3$

(C) $C_{22}H_{40}N_4Mg$ (D) NaH_2PO_4

120. Isolated DNA is considered as pure if :

(A) A^{260}/A^{280} is more than 1.7

(B) A^{260}/A^{280} is between 1.7 to 1.9

(C) A^{260}/A^{280} is less than 1.7

(D) This ratio has nothing to do with purity

121. Which of the following is called DNA scissor ?

(A) RNA polymerase (B) DNA polymerase

(C) Restriction endonuclease (D) DNA ligase

122. Gram +ve bacteria have in the cell wall :

(A) Less lipid and high peptidoglycan

(B) More lipid and less peptidoglycan

(C) Equal amount of lipids and peptidoglycan

(D) None of the above

123. Cobalt is a :

(A) Macronutrient (B) Micronutrient

(C) Energy source (D) Gelling agent

124. Biochemical test of proteins can be done by :

(A) Xanthoproteic test (B) Biuret test

(C) Xanthine oxidase test (D) Both (A) and (B)

125. Substances having the capacity to react with immune system and mount an immune response along with allergic manifestation are :

(A) Immunogens (B) Antigens

(C) Antibodies (D) None of these

126. Which is called as Drosophila of plant world ?

(A) Saccharomyces (B) Acetabularia

(C) Neurospora (D) *E. coli*

127. In RNAi, the alphabet 'i' stands for :

(A) Induction (B) Inversion

(C) Interference (D) Incubation

128. Which point mutation is less harmful ?

(A) Deletion (B) Insertion

(C) Substitution (D) All of these

129. Which is *not* a pathogen ?

(A) Mycoplasma (B) Lactobacillus

(C) Salmonella (D) Pneumococcus

130. Fission fungi is the name given to :

(A) Saccharomyces (B) Cyanobacteria

(C) Saprolegnia (D) Bacteria

131. Double stranded, circular DNA, not protected by nuclear membrane and without nucleolus is called :

(A) Nucleoid (B) Genophore

(C) Incipient nucleus (D) All of these

132. Leghaemoglobin is :

(A) Blood of non-chordates

(B) A type of blood cell

(C) Iron containing pigment in nitrogen fixing root nodules

(D) A component of cytochrome

133. Pure plant cultures can be obtained by :

(A) Somatic embryogenesis (B) Haploid cultures

(C) Protoplast fusion (D) Cybridization

134. Axenic cultures are :

(A) *In-vitro* cultures (B) *In-vivo* cultures

(C) Contamination free cultures (D) Micropropagation

135. Eutrophication is related to :

(A) Freshwater bodies

(B) Water bodies with high organic matter

(C) A dense forest ecosystem

(D) A process of eugenics

136. Fertile layer of the soil is :

(A) Subsoil (B) Top soil

(C) Both (A) and (B) (D) None of these

137. Radioactive pollution hazard was most severely suspected recently in :

(A) South America (B) The Netherlands

(C) Japan (D) Armenia

138. Soilless cultures are known as :

(A) Micropropagules (B) Mangroves

(C) Hydroponics (D) Implants

139. Carbon sequestration can be done by :

(A) Euglena

(B) Sulphur bacteria

(C) Photosynthetic microorganisms

(D) Mycoplasma

140. Vinegar is obtained through :

(A) Broth culture (B) Aerobic respiration

(C) Fermentation (D) Bioremediation

141. During Calvin cycle, CO_2 acceptor is :

(A) Phosphoglyceraldehyde (B) Ribulose 1, 5 diphosphate

(C) α-ketogluteric acid (D) Pyruvic acid

142. Krenz anatomy is found in :

(A) C_3 plants (B) C_4 plants

(C) All microorganisms (D) Dicoteledons only

143. Secondary metabolites :

(A) Constitute the plant body

(B) Synthesized and stored in plant parts

(C) Are of secondary use and of no commercial value

(D) End products of metabolic reactions

144. Most popular medicinal plant *Aloe vera* is a :

(A) Mesophyte (B) Hydrophyte

(C) Xerophyte (D) Mangrove plant

145. Antioxidants :

(A) Add toxic oxygen to the body

(B) Inactivate reactive oxygen

(C) Reduce cellular respiration

(D) Prevent dehydration

146. Language of gene is called as :

(A) Nucleoside (B) Gene sequence

(C) Genetic code (D) Operon

147. Which is naturally acquired active immunity ?

(A) Measles or Chicken pox (B) Filaria

(C) Hepatitis (D) IgG

148. Which of the following is commercially produced through fermentation ?

(A) Vitamin C (B) Vitamin D

(C) Vitamin B_{12} (D) Penicillin

149. A eutrophicated pond has the BOD :

(A) Optimum (B) Very high

(C) Very low (D) None of these

150. Gobar gas is produced from dung and is basically :

(A) Carbon mono-oxide (B) Hydrogen sulphide

(C) Methane (D) Butane