

# S/SO/2013/14 GENETICS

Roll No.						BOOKLET NO.	14013
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. What is the nature of protoplasm ?  
(A) Crystalline (B) Compound  
(C) Colloidal (D) Saturated solution
2. Who discovered the cell in section of cork ?  
(A) Leeuwenhoek (B) Schleiden  
(C) Robert Brown (D) Robert Hooke
3. Compound microscope contains how many lenses ?  
(A) 2 (B) 3  
(C) 4 (D) 1
4. Percentage of water in typical (plant) cell is :  
(A) 85% (B) 50%  
(C) 20% (D) 10%
5. Which of the following occurs only in RNA ?  
(A) Adenine (B) Cytosine  
(C) Guanine (D) Uracil
6. Distance between two strands of DNA is :  
(A) 3.4 Å (B) 34 Å  
(C) 340 Å (D) 20 Å

7. One turn of DNA helix measures :
- (A) 0.34 nm (B) 3.4 nm  
(C) 20 nm (D) 34 nm
8. One function of telomere in a chromosome is to :
- (A) help two chromatids to move towards poles  
(B) start R.N.A. synthesis  
(C) seal the ends of chromosome  
(D) identify correct number of chromosomes
9. Karyokinesis refers to the division of :
- (A) Cytoplasm into two (B) Nucleus into two  
(C) Protoplasm into two (D) None of these
10. During meiosis the chromosome number is reduced to half at :
- (A) Metaphase I (B) Anaphase I  
(C) Telophase I (D) Telophase II
11. Monohybrid test cross ratio comes as :
- (A) 1 : 1 (B) 1 : 1 : 1  
(C) 1 : 1 : 1 : 1 (D) 2 : 1

12. Improvement of mankind by genetic engineering is studied under :
- (A) Eugenics (B) Euthenics  
(C) Euphenics (D) Pathology
13. A pair of contrasting characters is represented by :
- (A) Homozygous (B) Heterozygous  
(C) Phenotype (D) Allelomorphs
14. A red flowered plant (RR) is crossed with white flowered plant (rr) and offsprings are pink (Rr), this shows that gene R is :
- (A) Mutant (B) Recessive  
(C) Hybrid (D) Incompletely dominant
15. A cross between  $F_1$  and recessive parent is :
- (A) Reciprocal cross (B) Monohybrid cross  
(C) Test cross (D) Dihybrid cross
16. One gene one enzyme theory was given by :
- (A) Schleiden and Schwann (B) Khorana and Nirenberg  
(C) Watson and Crick (D) Beadle and Tatum
17. Which is the true dihybrid condition ?
- (A) ttrr (B) ttRr  
(C) TtRr (D) Tt

18. How many types of gametes will be formed by the genotype individual AaBbCc ?
- (A) 16 (B) 8  
(C) 4 (D) 3
19. Basic structural unit of eukaryotic chromosome is :
- (A) Chromatin fibre (B) DNA  
(C) Nucleosome (D) Chromonema
20. When a single gene influences more than one trait, it is called :
- (A) Epistasis (B) Pseudodominance  
(C) Pleiotropy (D) None of these
21. Branch of science related with improvement of mankind genetics :
- (A) Human genetics (B) General genetics  
(C) Eugenics (D) Genetics
22. The most commonly used enzyme for polymerase chain reaction is :
- (A) DNA polymerase II (B) Reverse transcriptase  
(C) Klenow fragment (D) Taq. Polymerase
23. Genetically engineered bacteria have been successfully used in commercial production of :
- (A) Testosterone (B) Thyroxine  
(C) Melatonin (D) Human insulin

24. Genetically uniform population of an organism raised through tissue culture is called :
- (A) Graft (B) Clone  
(C) Plasmid (D) Hybrid
25. Genetic engineering is also known as :
- (A) somatic hybridization (B) Gene manipulation  
(C) Protoplast technology (D) Recombinant DNA technology
26. Biological scissors are :
- (A) Ligases (B) Polymerases  
(C) Transcriptases (D) Endonucleases
27. When foreign DNA is integrated with genome of virus acting as vector, which type of DNA is formed ?
- (A) Recombinant DNA (B) Chimeric DNA  
(C) Redundant DNA (D) Copy DNA
28. Superbug was created by :
- (A) Dilip Shah (B) Robert Fraley  
(C) Anand Chakraborty (D) Hargobind Khorana

29. Each restriction enzyme cleaves a molecule at :
- (A) End of genes
  - (B) Methyl group
  - (C) Time of DNA replication
  - (D) Particular nucleotide sequence
30. Genes which confer antibiotic resistance on bacteria are located on :
- (A) RNA
  - (B) Polysome
  - (C) Plasmid
  - (D) Chromosomal DNA
31. Restriction enzymes are isolated chiefly from :
- (A) Algae
  - (B) Fungi
  - (C) Protozoans
  - (D) Prokaryote
32. The prokaryotic genetic system has :
- (A) DNA without histones
  - (B) DNA with histones
  - (C) Neither DNA nor histones
  - (D) Either DNA or histones
33. Genetic engineering would not have been possible if these were absent :
- (A) RNA synthetase
  - (B) DNA ligase
  - (C) DNA polymerase
  - (D) Reverse transcriptase

34. The replication of DNA is :
- (A) Conservative and continuous
  - (B) Semiconservative and non-continuous
  - (C) Semiconservative and semi-continuous
  - (D) Semiconservative and continuous
35. Weismann gave which theory ?
- (A) Continuity of germplasm
  - (B) Continuity of somatoplasm
  - (C) Laws of heredity
  - (D) Theory of mutation
36. During elongation of polypeptide chain (in translation), the sigma factor :
- (A) is released to again take part
  - (B) is retained and performs special function
  - (C) the function is unknown
  - (D) is used during the closing of chain
37. The parents of 'Triticale' are :
- (A) Wheat and rye
  - (B) Wheat and maize
  - (C) Barley and maize
  - (D) Barley and rye
38. Cell membrane is made up of :
- (A) Protein and lipid
  - (B) Protein, lipid and little DNA
  - (C) Carbohydrates
  - (D) Proteins and cellulose

39. Cytoplasmic bridge lined with a plasma membrane that connects adjacent cell is :
- (A) Protein (B) Nerve  
(C) Steroids (D) Plasmodesmata
40. Man-made crop is :
- (A) *Triticum* (B) *Hordeum*  
(C) *Raphanobrassica* (D) *Eleusine*
41. Ribozyme is :
- (A) Enzyme (B) Protein  
(C) Hormone (D) RNA having enzyme activity
42. *t*-RNA molecules have anticodons that pair complementary to the codons in :
- (A) *m*RNA (B) *r*RNA  
(C) *t*RNA (D) All of these
43. Which disease is caused by activation of oncogenes ?
- (A) Viral flu (B) Tuberculosis  
(C) Cancer (D) Cholera

44. A micromutation is :

- (A) Polyploidy (B) Additions of chromosome  
(C) Change in gene (D) Deletion of chromosome

45. The diameter of Z-DNA molecule is .:

- (A) 18 Å (B) 34 Å  
(C) 45 Å (D) 22 Å

46. A nucleoside is :

- (A) Purine/Pyrimidine + Sugar  
(B) Purine/Pyrimidine + Phosphate  
(C) Sugar + Phosphate  
(D) Purine/Pyrimidine + Sugar + Phosphate

47. The function of *t*RNA is :

- (A) Selection of amino acids (B) Production of *m*RNA  
(C) Production of ribosomes (D) Production of microspores

48. A chemical mutagen is :

- (A) X-ray  
(B) Dichloromethyl Urea (DCMU)  
(C) Gamma ray  
(D) Ethyl Methane Sulphonate (EMS)

49. A gene showing codominance :
- (A) has both alleles independently expressed
  - (B) has one allele dominant to other
  - (C) has alleles expressed at the same time
  - (D) has alleles that are recessive to each other
50. Which component of transcribed RNA in eukaryotes is present in the initial transcript but is removed before translation occurs ?
- (A) Intron
  - (B) 3' poly A tail
  - (C) Ribosome binding site
  - (D) 5' cap
51. Polyploidy refers to :
- (A) extra copy of gene
  - (B) extra set of chromosomes
  - (C) the chromosome which has replicated but not divided
  - (D) multiple ribosomes on single *mRNA*
52. What would be the frequency of AABBCc individuals from mating two AaBbCc individuals ?
- (A) 1/64
  - (B) 1/32
  - (C) 1/16
  - (D) 3/16
53. DNA ligase is an enzyme :
- (A) that joins fragments in DNA replication
  - (B) involved in protein synthesis
  - (C) which cuts DNA at defined sequences
  - (D) that facilitates transcription

54. An Hfr strain of *E.coli* contains :
- (A) A bacterial chromosome with inserted human gene
  - (B) A bacterial chromosome with inserted F factor
  - (C) A human chromosome with transposable element
  - (D) A bacterial chromosome with phage
55. Colour blindness in man is :
- (A) Due to deficiency of vitamin A
  - (B) Due to absence of visual pupil in retina
  - (C) Due to absence of rods in retina
  - (D) A sex-linked abnormality
56. The central dogma of protein synthesis is given by :
- (A) Khorana
  - (B) Nathans
  - (C) Crick
  - (D) Baltimore
57. RFLP is a :
- (A) Genetic signal
  - (B) Genetic code
  - (C) Vector
  - (D) Genetic marker
58. DNA fingerprinting is a technique used in :
- (A) Solving criminal and paternity cases
  - (B) Reconstructing human relationships
  - (C) Transfer of disease resistance to bone marrow
  - (D) Estimating matches for blood transfusions

59. PCR is a technique that :
- (A) Demonstrates DNA as genetic material
  - (B) Determines minerals in soil samples
  - (C) Measures ribosome transfer rate
  - (D) Replicates DNA sequences *in-vitro*
60. Majority of new mutations appear to be :
- (A) beneficial
  - (B) neutral or deleterious
  - (C) detectable using allozyme studies
  - (D) present within pericentric inversions
61. RNA molecules that exhibit catalytic activity are called :
- (A) *mRNAs*
  - (B) ribonucleases
  - (C) ribosomes
  - (D) ribozymes
62. Cellular proteins destined for secretion are sorted and packaged in the :
- (A) Lysosomes
  - (B) Peroxisomes
  - (C) Endoplasmic reticulum
  - (D) Trans Golgi network
63. An *E.coli* strain lacking DNA polymerase I would be deficient in DNA :
- (A) repair
  - (B) splicing
  - (C) degradation
  - (D) transcription

64. Blood group B will have alleles :
- (A) ii (B)  $I_A I_A$   
(C)  $I_B I_B$  (D) ii or  $I_B I_B$
65. Which one is ineffective against antibiotics ?
- (A) Bacterial infected wound  
(B) Bacterial infected throat  
(C) Haemophilia  
(D) Bacterial infected gonorrhoea
66. Genetic code was given by :
- (A) Watson and Crick  
(B) Nirenberg  
(C) Beadle and Tatum  
(D) Kings, Watson and Crick
67. Which of the following is genetically dominant in man ?
- (A) Colour blindness (B)  $Rh^+$   
(C) Haemophilia (D) Albinism
68. The stage of meiosis in which chromosomes pair and cross over is :
- (A) Prophase I (B) Metaphase I  
(C) Prophase II (D) Metaphase II

69. Mutations occurring in body cells are :
- (A) Auxotrophic mutations                      (B) Somatic mutations  
(C) Morphological mutations                      (D) Sensitive mutations
70. The phenomenon of "independent assortment" is based on :
- (A) Monohybrid cross                      (B) Dihybrid cross  
(C) Trihybrid cross                      (D) Back cross
71. In *Melandrium* sex chromosomes form :
- (A) Hemomorphic bivalent                      (B) Zygomorphic bivalent  
(C) Heteromorphic bivalent                      (D) Hyperactive bivalent
72. Homeobox sequences :
- (A) present in genome of many animal species  
(B) found in prokaryotes not in eukaryotes  
(C) represent integration sites for bacterial viruses  
(D) are integration sites for transposable elements
73. Transcriptional activator proteins :
- (A) transcribe a messenger off a DNA template  
(B) bind to ribosomes to activate proteins  
(C) produced during an infection of bacteria by phage  
(D) bind regions near eukaryotic gene

74. *Arabidopsis* is advantageous for plant genetic research because :
- (A) it is commercially important as food crop
  - (B) it is an endangered species
  - (C) it is closest to humans
  - (D) it is small plant with a small genome size
75. A homeotic mutation is one which :
- (A) is present in only one form in an individual
  - (B) substitutes one body part for another in development
  - (C) results in development of a tumor
  - (D) leads to increase body size in an organism
76. Plasmid vectors for cloning :
- (A) can accommodate larger inserts than phage vectors
  - (B) can grow within bacteria and are present on agar
  - (C) can accommodate inserts over 100 kilobases
  - (D) include centromeres to allow propagation in yeast
77. The "Sticky ends" allow :
- (A) selection for plasmids
  - (B) identification of plasmids
  - (C) replication of *tRNA*
  - (D) pieces of DNA from different sources to hybridize

78. Mitochondrial DNA is advantageous for evolutionary studies because :
- (A) it is inherited through female parent
  - (B) it is inserted into X-chromosome
  - (C) it evolves more slowly than genes in nucleus
  - (D) it was derived from globin genes as an extra copy
79. Twin studies in humans are useful because :
- (A) they allow refine estimates of chromosome
  - (B) they are heterozygous
  - (C) allow improved expression of gene
  - (D) establish interaction of heredity and environment
80. Alleles are :
- (A) alternative forms of gene
  - (B) false forms of gene
  - (C) extra forms of gene
  - (D) defective gene
81. The penetrance is :
- (A) insertion of gene
  - (B) elimination of gene
  - (C) ability of a gene to express
  - (D) incomplete expression of gene
82. When one gene specifies more traits, it is :
- (A) Pleiotropism
  - (B) Atavism
  - (C) Polytropism
  - (D) Dwarfism

83. Epistasis is :
- (A) masking effect of one allele over other
  - (B) masking effect of one gene over other
  - (C) masking effect of one plant over other
  - (D) masking of proteins
84. Lethal genes can :
- (A) kill their bearers
  - (B) Handicap their bearers
  - (C) kill the insects on plants
  - (D) kill the weeds
85. Sickle cell Anaemia is caused by :
- (A) Pleiotropic gene
  - (B) Penetrant gene
  - (C) Multiple alleles
  - (D) Lethal genes
86. Synapsis takes place at :
- (A) Zygotene
  - (B) Diplotene
  - (C) Pachytene
  - (D) Diakinesis
87. Xenia is :
- (A) Masking effect of single dose of an allele over double dose of alternative allele
  - (B) Masking effect of multiple dose of allele
  - (C) masking effect of gene
  - (D) masking effect of lethal alleles

88. Seedless watermelons are :
- (A) Autotetraploids (B) Autotriploids  
(C) Autopentaploids (D) Allopolyploids
89. Haploids have :
- (A) Single set of genome  
(B) Double set of genome  
(C) Multiple set of genome  
(D) No genome
90. Which one of the following can behave as new species ?
- (A) Autopolyploids (B) Allopolyploids  
(C) Autotriploids (D) Autohexaploids
91. Double monosomy has a general formula :
- (A)  $2n - 1$  (B)  $2n - 1 - 1$   
(C)  $2n - 2$  (D)  $2n - 2 - 2$
92. Klinefelter syndrome is the result of :
- (A) Sex chromosomal abnormality  
(B) Autosomal abnormality  
(C) Genetic abnormality  
(D) Morphological abnormality

93. The functional unit of gene is :
- (A) Muton (B) Recon  
(C) Cistron (D) Retron
94. Who discovered transposons ?
- (A) Hargobind Khorana (B) Morgan  
(C) Hugo de Vries (D) Barbara McClintock
95. Operon hypothesis was proposed by :
- (A) Jacob and Monad (B) Beadle and Tatum  
(C) Harshe and Chase (D) Watson and Crick
96. Quantitative inheritance is through :
- (A) Defective genes (B) Special genes  
(C) Polygenes (D) Ultragenes
97. Kappa particles are found in :
- (A) Amoeba (B) Ascaris  
(C) Daphnia (D) *Paramoecium*
98. Shell coiling in snails is :
- (A) Nuclear inheritance  
(B) Extra-nuclear inheritance  
(C) Cris cross inheritance  
(D) Mendelian inheritance

99. Inbreeding refers to :
- (A) Increase in homozygosity                      (B) Increase in heterozygosity  
(C) Increase in fertility                              (D) Increase in sterility
100. Exchanges between non-homologous sets of chromosomes are :
- (A) Recombinations                                      (B) Inversions  
(C) Translocations                                        (D) Transductions
101. Point mutations are :
- (A) Change in chromosome number  
(B) Change in chromosome structure  
(C) Change at DNA level  
(D) Change in nucleus
102. Transitions are :
- (A) Replacement of purines by purines  
(B) Replacement of purines by pyrimidines  
(C) Replacement of one gene by other  
(D) Replacement of one chromosome by other
103. Bacteria were first discovered by :
- (A) Louis Pasteur    (B) A. Von Leeuwenhoek  
(C) Robert Koch    (D) Robert Hooke

104. Bacteria differ from other plants in that they do not have :
- (A) DNA (B) RNA  
(C) Cell wall (D) A well defined nucleus
105. Bacteria are considered to be the plants because they :
- (A) Have a rigid cell wall (B) Cannot move  
(C) Are present everywhere (D) Can multiply by fission
106. The shape of *E.coli* bacterium is :
- (A) Rod (B) Round  
(C) Spiral (D) Fusiform
107. The cells of cyanobacteria and bacteria exhibit similarity in having :
- (A) plastid (B) nuclei  
(C) centrosome (D) DNA
108. The bacterium used in natural genetic engineering is :
- (A) *Rhizobium* (B) *Agrobacterium*  
(C) *Streptococcus* (D) *Micrococcus*
109. Bacteriophage consists of :
- (A) Carbon and nitrogen (B) DNA  
(C) Nucleoproteins (D) Proteins only

110. Genetic material of TMV is :
- (A) DNA (B) FAT  
(C) RNA (D) None of these
111. Which part of the cell disappears during mitosis ?
- (A) Plastid (B) Nucleolar membrane  
(C) Plasma membrane (D) None of these
112. The technique of DNA fingerprinting was first developed by :
- (A) Alec Jefferey (B) Lal ji Singh  
(C) M.S. Swaminathan (D) Barbara McClintock
113. Linkage was established by :
- (A) Bridges (B) Morgan  
(C) Mendel (D) Erick
114. Complementary interaction of genes gives the ratio :
- (A) 13 : 3 (B) 15 : 1  
(C) 9 : 7 (D) 1 : 1
115. Cells with abundant microvilli are found in :
- (A) exocrine glands (B) adipose tissue  
(C) neuronal dendrites (D) absorptive epithelia

116. Virus mediated transfer of genetic material is :
- (A) induction (B) transfection  
(C) transduction (D) transposition
117. In operon concept, a repressor protein binds to :
- (A) an enhancer (B) an operator  
(C) an AUG sequence (D) a TATA box
118. In animals, enzyme unique to gluconeogenesis is :
- (A) enolase (B) phosphoglyceromutase  
(C) aldolase (D) fructose 1, 6 bisphosphatase
119. Which one *does not* make direct use of a pH ?
- (A) Mitochondrion (B) Chloroplast  
(C) Protozoan cilium (D) Bacterial flagellum
120. Which of the process *does not* occur in mitochondria of mammalian cell ?
- (A) fatty acid biosynthesis (B) protein synthesis  
(C) DNA synthesis (D) citric acid cycle
121. DNA transcribes to :
- (A) rRNA (B) tRNA  
(C) mRNA (D) hnRNA

122. Which one of the following is initiation codon ?

- (A) AUG (B) AGG  
(C) AGA (D) UAA

123. Genetic code is :

- (A) Singlet (B) Doublet  
(C) Triplet (D) Multilet

124. Intelligence in man is :

- (A) Polygenic trait (B) Mendelian trait  
(C) Congenital trait (D) Morphological trait

125. Polydactyly refers to :

- (A) 5 fingers (B) less than five fingers  
(C) more than five fingers (D) six fingers

126. *Rhizobium* carries :

- (A) nif genes (B) trans genes  
(C) cis genes (D) restorer genes

127. Geneticists associated with human genome project :
- (A) Creig Venter and Francis Collins
  - (B) Kornberg and Thomas
  - (C) Beadle and Tatum
  - (D) DeVries and Correns
128. Approximate number of genes in human diploid cell is :
- (A) 50 thousand
  - (B) 80 thousand
  - (C) 30 thousand
  - (D) 20 thousand
129. B-chromosomes have got :
- (A) Mendelian inheritance
  - (B) Non-Mendelian inheritance
  - (C) Polygenic inheritance
  - (D) Conventional type of inheritance
130. Aneuploidy arising through loss of chromosomes :
- (A) Hypoploidy
  - (B) Nanoploidy
  - (C) Lethoploidy
  - (D) Aploidy



135. Bivalents are formed during :

- (A) Mitosis (B) Meiosis  
(C) Cytokinesis (D) Karyokinesis

136. Ti-plasmid of *Agrobacterium* carries :

- (A) Terminator gene (B) Tumour inducing gene  
(C) Transferred gene (D) Tracer gene

137. When a wild type character is changed into mutant character, it is :

- (A) Forward mutation  
(B) Spontaneous mutation  
(C) Autosomal mutation  
(D) Sex-linked mutation

138. Apoptosis refers to :

- (A) cell elongation (B) cell maturation  
(C) cell death (D) cell division

139. Taq-polymerase used in PCR is obtained from :
- (A) *Thermus aquaticus* (B) *Bacillus thuringensis*  
(C) *Pseudomonas scabies* (D) *Vibrio choleri*
140. Crossing over takes place at :
- (A) Diplotene (B) Pachytene  
(C) Leptotene (D) Zygotene
141. Mis-division of centromere gives rise to :
- (A) Duplicated chromosome  
(B) Deficient chromosome  
(C) Isochromosomes  
(D) Giant chromosome
142. Meiotic division takes place in the cells of :
- (A) Root tips (B) Pollen mother cells  
(C) Stem tips (D) Leaf tips

143. The number of autosomes found in a diploid human cell is :
- (A) 48 (B) 23  
(C) 44 (D) 40
144. Organized clathrin structures are associated with :
- (A) nuclear envelop (B) Lysosomes  
(C) extracellular matrix (D) trans golgi network
145. Which hormone initiates biological actions by crossing the plasma membrane and binding to a receptor ?
- (A) Glucagon (B) Estradiol  
(C) Insulin (D) Norepinephrine
146. Common lesions found in DNA exposed to UV light are :
- (A) pyrimidine dimers (B) single strand breaks  
(C) base deletions (D) purine dimers
147. Which bonds are least likely to be involved in stabilizing three-dimensional folding of proteins ?
- (A) Hydrogen bonds (B) Ester bonds  
(C) Disulfide bonds (D) Electrostatic bonds

148. Which enzyme is involved in biosynthesis of collagen ?
- (A) Prolyl hydroxylase
  - (B) Choline oxidase
  - (C) Monoamine oxidase
  - (D) Tryptophan oxygenase
149. The specialized structures located at the ends of eukaryotic chromosomes are called :
- (A) terminators
  - (B) telomeres
  - (C) centromeres
  - (D) kinetochores
150. All of the following compounds are capable of forming hydrogen bonds with water, *except* :
- (A) Methanol
  - (B) Acetamide
  - (C) Methyl acetate
  - (D) Hexane