

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU
ARE ASKED TO DO SO)

M. Phil/Ph.D/URS - EE - Jan.-Dec.-2017

SUBJECT : Life Science

A

10205

Sr. No.

Time : 1¼ Hours

Max. Marks : 100

Total Questions : 100

Roll No. (in figures) _____ (in words) _____

Name _____ Father's Name _____

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(Signature of the Candidate)

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SEAL

11. Non-competitive inhibitors :
- | | |
|----------------------------|----------------------------|
| (1) Increase the K_m | (2) Decrease the K_m |
| (3) Increase the V_{max} | (4) Decrease the V_{max} |
12. Which technique is used to visualize the distribution of proteins in membrane ?
- | | |
|----------------------------------|-----------------------------|
| (1) Freeze-fracture technique | (2) FRAP |
| (3) Scanning electron microscopy | (4) Atomic force microscopy |
13. p53 gene is
- | | |
|------------------------------|-----------------------|
| (1) A proto-oncogene | (2) An oncogene |
| (3) A tumour suppressor gene | (4) None of the above |
14. Which one of the following is the correct sequence of the movement of e^- during the light dependent reactions of plants from PSII to PSI ?
- | |
|--|
| (1) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700} |
| (2) P_{680} -plastocyanin -cytochrome b_6f - plastoquinone- P_{700} |
| (3) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700} |
| (4) P_{680} - plastoquinone- plastocyanin -cytochrome b_6f - P_{700} |
15. Which of the following pathway occurs in the cytoplasm and do not require the presence of oxygen ?
- | | |
|-----------------------------|-------------------------------|
| (1) Krebs cycle | (2) Glycolysis |
| (3) Pentose-phosphate cycle | (4) Electron-transport system |
16. Which one of the following microbodies is associated with the conversion of fat to carbohydrates in plants ?
- | | | | |
|---------------|-----------------|-----------------|-----------------|
| (1) Lysosomes | (2) Peroxisomes | (3) Glyoxysomes | (4) Spherosomes |
|---------------|-----------------|-----------------|-----------------|
17. In higher plants, the reduction of nitrate into ammonia takes place by the combined action of nitrate reductase localized in cytosol and nitrite reductase localized in :
- | | | | |
|---------------|-----------------|------------------|-----------------|
| (1) Cytoplasm | (2) Chloroplast | (3) Mitochondria | (4) Peroxisomes |
|---------------|-----------------|------------------|-----------------|
18. Which of the following plant hormones use the two-component receptor system for signal transduction ?
- | | | | |
|------------|-----------------|---------------|-----------------|
| (a) Auxin | (b) Gibbrellins | (c) Cytokinin | (d) Ethylene |
| (1) c only | (2) c and d | (3) a and b | (4) All of them |
19. The rhizobial genes responsible for nodule formation are termed *nod* genes. Which one of the following secondary compounds released by legume roots serve as chemo-attractants for the rhizobial symbiont and also regulate the expression of rhizobial *nod* genes?
- | | | | |
|----------------|---------------|----------------|---------------|
| (1) Terpenoids | (2) Phenolics | (3) Flavonoids | (4) Alkaloids |
|----------------|---------------|----------------|---------------|

20. Which major wave length of light is responsible for stomatal movement in leaves of well-watered plants grown in natural environment ?
(1) Red light (2) Blue light (3) Green light (4) Far-red light
21. Depurination refers to :
(1) Breakage of phosphodiester bonds
(2) breakage of hydrogen bonds
(3) Breakage of β -glycosidic bonds
(4) Deamination of adenine/guanine residues
22. Eukaryotic small stable RNAs involved in splicing of the precursor mRNA are :
(1) SnoRNA (2) SnRNA (3) siRNA (4) ScaRNA
23. If DNA sequence is ATG then what would be the sequence of bases in anticodon of tRNA ?
(1) ATG (2) UAC (3) TAC (4) AUG
24. During prokaryotic DNA replication, the RNA primers are degraded by the 5' to 3' exonuclease activity of :
(1) DNA polymerase I (2) DNA polymerase II
(3) DNA polymerase III (4) Topoisomerase II
25. From a DNA-RNA hybrid, DNA can be obtained by addition of:
(1) Helicase and ATP (2) DNA topoisomerase I
(3) DNA-B protein and ATP (4) Alkali
26. Alternate purine and pyrimidine bases are present in :
(1) A-DNA (2) B-DNA (3) Z-DNA (4) None of the above
27. What do you call to genetically modified plants that do not contain the DNA from other species ?
(1) Transgenic plant (2) Cisgenic plant
(3) Transplastomic plant (4) Autogenic plant
28. Name the technique used to determine the copy number of a transgene in the genome of a transgenic plant or animal ?
(1) Northern blotting
(2) Western blotting
(3) Southern blotting
(4) All of the above

29. Which of the following is *not* a technique to analyze protein-protein interaction ?
(1) Yeast two-hybrid (2) Yeast one-hybrid
(3) Pull-down assay (4) BiFC
30. Which one of the followings is used in genome editing ?
(1) TALENs (2) ZFNs (3) CRISPR-Cas (4) All of the above
31. TILLING is a reverse genetic approach used in functional genomics. It involves :
(1) T-DNA tagging
(2) Ethyl methane sulphonate mutagenesis
(3) Transposon/retrotransposon tagging
(4) Gene silencing using RNA interference
32. Which statement is incorrect about ribozymes ?
(1) Ribozymes are composed of RNA and protein
(2) It is the RNA component of the ribozyme which performs catalytic role
(3) It is the protein component of the ribozyme that performs catalytic role
(4) Ribozymes cause cleavage and ligation of RNA and DNA and peptide bond formation.
33. An endogenous gene of a plant can be more effectively suppressed by introducing which one of the following sequences ?
(1) Single stranded sense RNA of the endogenous gene
(2) Antisense RNA of the endogenous gene
(3) dsRNA of the endogenous gene
(4) None of the above
34. RNA polymerase is composed of two α - subunits, one β - subunit, one β' - subunit and one σ subunit. Which one subunit (factor) is involved in initiation of transcription ?
(1) α -subunit
(2) β -subunit
(3) β' -subunit
(4) σ -subunit
35. Dideoxynucleotides differ from deoxynucleotides because an additional hydroxyl group is missing from position :
(1) 5' (2) 1' (3) 2' (4) 3'

36. Arrange the following vectors in ascending order in terms of size of possible inserts :
- (1) BACs, cosmids, plasmids, bacteriophage
 - (2) Cosmids, bacteriophage, plasmids, BACs
 - (3) Plasmids, bacteriophage, cosmids, BACs
 - (4) Bacteriophage, BACs, plasmids, cosmids
37. The operon model, a negative control mechanism was developed in 1961 by :
- (1) Griffith & coworkers
 - (2) Jacob and Monod
 - (3) Zinder and Lederberg
 - (4) Lederberg and Tatum
38. A virus-free clone from a virus infected plant can be obtained by :
- (1) Protoplast culture
 - (2) Cotyledonary leaf culture
 - (3) Stem culture
 - (4) Meristem tip culture
39. The lens used in the "objective" of a compound microscope is :
- (1) Convex lens
 - (2) Concave lens
 - (3) Combination of convex and concave lens
 - (4) Plano-convex lens
40. Roll-tube procedure is used to isolate :
- (1) Aerobes
 - (2) Anaerobes
 - (3) Thermopiles
 - (4) Facultative aerobes
41. Rhodotorula is used to produce :
- (1) Organic acids
 - (2) Antibiotics
 - (3) Lipids
 - (4) Amino acids
42. Microorganisms indigenous to a particular environment are :
- (1) Autochthonous
 - (2) Allochthonous
 - (3) Zygotogenous
 - (4) Autogenous
43. Rickettsias are commonly transmitted through :
- (1) Air
 - (2) Water
 - (3) Soil
 - (4) Arthropod vectors
44. Which immunoglobulin class crosses the placenta to provide a high level of passive immunity at birth ?
- (1) IgA
 - (2) IgE
 - (3) IgG
 - (4) IgM

45. The T-cell receptor link to MHC/peptide is enhanced by interaction between MHC class II on the antigen-presenting cells with the following molecule on the T-cell :
 (1) CD2 (2) CD4 (3) CD8 (4) CD28
46. An example of an anti-apoptotic molecule is :
 (1) Caspase 8 (2) Bax (3) Bcl-2 (4) TRAIL
47. In celiac disease, there is T-cell sensitivity to :
 (1) Myelin basic protein (2) Gluten
 (3) Gastric $H^+ - K^+$ dependent ATPase (4) β -adrenergic receptors
48. Antigen in tissues can be localized with fluorescent antibodies using :
 (1) Flow cytofluorimetry (2) Confocal fluorescence microscope
 (3) The electron microscope (4) An enzyme substrate
49. A hapten is :
 (1) An epitope
 (2) A carrier
 (3) An immunogen
 (4) A small chemical grouping which reacts with preformed antibodies
50. BCG is used to protect against :
 (1) Tuberculosis (2) Pertussis (3) Hepatitis B (4) Influenza
51. Two plants with white flowers are crossed. White flowers arise due to recessive mutation. All F_1 progeny have red flowers. When F_1 plants are selfed, both red and white flowered progeny are observed. In what ratio will red flowered plants and white flowered plants occur ?
 (1) 1 : 1 (2) 3 : 1 (3) 9 : 7 (4) 15 : 1
52. *Cephaleuros* is :
 (1) An endophytic alga (2) A parasitic alga
 (3) A freshwater alga (4) A lithophytic alga
53. Telomerase is an enzyme whose macromolecular composition is :
 (1) Ribonucleic acid (2) Lipoprotein
 (3) Ribonucleoprotein (4) Protein only
54. The small size of the *Arabidopsis thaliana* genome makes it feasible to construct complete physical maps for all :
 (1) 5 chromosomes (2) 10 chromosomes
 (3) 15 chromosomes (4) 21 chromosomes

55. Which one of the following techniques will you use to identify more than 1000 differentially expressed genes in normal and tumor tissues in one single experiment ?
- (1) RAPD (2) Genome sequencing
(3) CHIP assay (4) Transcriptome analysis
56. Which of the following microbe is used as biopesticide :
- (1) *Agrobacterium tumefaciens* (2) *Bacillus thuringiensis*
(3) *Agrobacterium rhizogenes* (4) *Bacillus amyloliquefaciens*
57. Which of the following combination of molecular markers is PCR based ?
- (1) RFLP, SSR, RAPD (2) RFLP, AFLP, SSR
(3) AFLP, RAPD, SSR (4) RAPD, RFLP, AFLP
58. The amino-terminal residue of a protein is identified by :
- (1) Fluorodinitro benzene (2) Phenyl isothiocyanate
(3) Dabsyl Chloride (4) All of them
59. The two most common processes that lead to production of multiple functional proteins from the same DNA sequence are:
- (1) RNA editing and alternative editing
(2) Protein folding and posttranslational covalent modification
(3) Alternative editing and posttranslational covalent modification
(4) Posttranslational covalent modification and transcriptional regulation
60. A woman with normal vision but with colour-blind father marries a colour-blind man. The child of the couple is a boy. This boy :
- (1) may or may not be colour-blind
(2) must be colour-blind
(3) must have normal vision
(4) will be partially colour-blind due to being heterozygous
61. Consumption of raw egg white is injurious to health because it blocks the absorption of :
- (1) Pyridoxine (2) Thiamin (3) Biotin (4) Lipoic acid
62. A polysaccharide composed of fructose units :
- (1) Chitin (2) Cellulose (3) Inulin (4) Glycogen
63. All the followings are omega-6 fatty acids except :
- (1) Linoleic acid (2) α -Linolenic acid
(3) γ -Linolenic acid (4) Arachidonic acid

64. Female *Aedes aegyptii* mosquitos transmit virus that causes which one of the following diseases ?
 (1) Zika fever (2) Chikungunya fever
 (3) Dengue fever (4) All of them
65. The El Nino / La Nina-Southern Oscillation (ENSO) is a climate pattern that occurs across Pacific ocean roughly once in :
 (1) 2 years (2) 3 years (3) 4 years (4) 5 years
66. Ozone layer in the atmosphere absorbs only :
 (1) UV - A radiation (2) UV-B radiation
 (3) UV - C radiation (4) UV-B and UV-C radiations
67. Amongst the animal groups given below, which one has the highest percentage of endangered species ?
 (1) Insects (2) Mammals (3) Amphibians (4) Reptiles
68. The pyramid of biomass will be inverted in the ecosystem of :
 (1) Forests (2) Lakes (3) Grassland (4) Desert
69. An example of the species interaction called 'commensalism' is :
 (1) Lichens made up of a fungus and an alga
 (2) Hookworms living in the host's gut
 (3) Orchid plant growing on the trunk of a tree
 (4) Bedbug deriving nourishment from human blood
70. What is the general term used to describe the degradation of pollutants using a biological approach ?
 (1) Biodegradation (2) Bioaugmentation
 (3) Bioremediation (4) Biostimulation
71. The wings of insects and wings of bats represent a case of :
 (1) Divergent evolution (2) Co-evolution
 (3) Parallel evolution (4) Convergent evolution
72. Which of the following is *not* useful for phylogenetic analysis of human populations ?
 (1) Ribosomal RNA genes (2) Mitochondrial DNA
 (3) Microsatellites (4) Multiallelic genes
73. During which geological period was there the maximum diversity of reptiles ?
 (1) Jurassic (2) Triassic (3) Cretaceous (4) Permian

74. Who proposed the most widely accepted scientific theory of the 'Origin of Life' ?
 (1) Charles Darwin (2) Oparin and Haldane
 (3) Miller and Urey (4) Laderberg and Tatum
75. Hardy-Weinberg genetic equilibrium holds good for :
 (1) Panmictic population (2) Mendelian population
 (3) Assortative mating population (4) Dissortative mating population
76. A pregnant human female excretes :
 (1) HCG (2) FSH (3) LH (4) Progesterone
77. The process of gastrulation in amphibian embryo starts from the dorsal lip of blastopore by :
 (1) Involution (2) Ebiboly (3) Delamination (4) Evagination
78. Glucagon hormone is secreted by :
 (1) β -cells of islets of langerhans
 (2) α -cells of islets of langerhans
 (3) δ -cells of islets of langerhans
 (4) γ -cells of islets of langerhans
79. Which of the amino acid is encoded by only a single codon :
 (1) Glutamine (2) Tryptophan (3) Asparagine (4) Isoleucine
80. Conjugation between an F^+ and an F^- cell usually results in :
 (1) Two F^+ cells (2) Two F^- cells
 (3) An F^+ and an F^- cell (4) An Hfr cell and an F^+ cell
81. Match the following larval forms with the phyla that they occur in :
- | Larval forms | Phylum |
|----------------|--------------------|
| (a) Glochidium | (i) Echinodermata |
| (b) Planula | (ii) Hemichordate |
| (c) Bipinnaria | (iii) Coelenterata |
| (d) Tornaria | (iv) Mollusca |
- (1) a-iv, b-iii, c-ii, d-i
 (2) a-iv, b-iii, c-i, d-ii
 (3) a-iii, b-iv, c-i, d-ii
 (4) a-ii, b-iii, c-i, d-iv

82. Match List - 1 correctly with List - 2 :

List - 1

- (i) Planaria
- (ii) Earthworm
- (iii) Prawn
- (iv) Scorpion
- (1) I-d, II-c, III-a, IV-b
- (3) I-c, II-b, III-d, IV-a

List - 2

- (a) Green gland
- (b) Malpighian tubes
- (c) Nephridia
- (d) Flame Cell
- (2) I-b, II-c, III-d, IV-a
- (4) I-a, II-d, III-c, IV-b

83. Schizocoel is present in :

- (1) Aschelminthes
- (2) Arthropoda
- (3) Echinodermata
- (4) Hemichordata

84. The amount of air that move in and out of the lungs, with each normal inspiration and expiration is called :

- (1) Tidal capacity
- (2) Vital capacity
- (3) Tidal volume
- (4) Residual volume

85. Platyhelminths are described as :

- (1) Flatworms, triploblastic, acoelomate
- (2) Flatworms, diploblastic, acoelomate
- (3) Flatworms, diploblastic, coelomate
- (4) Flatworms, triploblastic, coelomate

86. Basic unit of muscle contraction is :

- (1) Actin
- (2) Myosin
- (3) Sarcomere
- (4) Tropomyosin

87. Floral development is controlled by overlapping expression of 'A' class, 'B' class, and 'C' class genes in different whorls. In Arabidopsis mutant, the flowers had sepal, petal, petal and sepal in four whorls. Mutation in which one of the followings is the cause of the mutant phenotype ?

- (1) 'A' class gene alone
- (2) 'B' class gene alone
- (3) A and B class genes
- (4) C class gene alone

88. If an organism is respiring in a bel jar filled with radio-labelled oxygen, the radioactivity will be detected in which product of respiration :

- (1) CO₂
- (2) H₂O
- (3) CO₂ and H₂O
- (4) C₆H₁₂O₆

89. HAART strategy is used for the treatment of :

- (1) Hepatitis B
- (2) Syphilis
- (3) AIDS
- (4) Hepatitis C

90. Which of the followings are the characteristics of Gymnosperms ?

- (A) Naked ovules
- (B) Double Fertilization
- (C) Absence of tracheids
- (D) Haploid endosperm

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

91. Match the items in **Column - I** with those in **Column - II** :

Column - I

- (A) Scutellum
- (B) Palynology
- (C) Dendrochronology
- (D) Quiescent centre

- (1) A-d, B-c, C-a, D-b
- (2) A-d, B-a, C-b, D-c
- (3) A-b, B-a, C-c D-d
- (4) A-c, B-d, C-a, D-b

Column - II

- (a) Annual rings
- (b) Root
- (c) Pollen
- (d) Monocot

92. The half-life of radioactive ^{35}S is :

- (1) 8.7 days
- (2) 14 days
- (3) 87 days
- (4) 164 days

93. As we move from one geographical region to next neighbouring region, species diversity tends to change. It is termed as :

- (1) α -diversity
- (2) β -diversity
- (3) γ -diversity
- (4) δ -diversity

94. The fluid mosaic model of plasma membrane given by Sanger and Nicolson is applicable to:

- (1) Only prokaryotic membrane
- (2) Only eukaryotic membrane
- (3) Both prokaryotic and eukaryotic membranes
- (4) Only to organelle membranes

95. Which one of the followings get activated by diacylglycerol (DAG)

- (1) MAP kinase
- (2) Tyrosine kinase
- (3) Protein kinase A
- (4) Protein kinase C

96. Activation of a gene is marked by :

- (1) Phosphorylation
(2) Acetylation
(3) Methylation
(4) Myristoylation

97. Siderophores are :

- (a) Make complex with Fe^{3+}
(b) Help in Iron transport
(c) Secreted by microbes
(d) Contain heme prosthetic group

- (1) a, b and c
(2) c and d
(3) a and c
(4) a, b, c and d

98. Cell cycle is controlled by :

- (a) Cyclin synthesis and degradation
(b) Phosphorylation of cyclin dependent kinases
(c) Binding to CDK inhibitor proteins
(d) Dephosphorylation of cyclin dependent kinases

- (1) a and b
(2) c and d
(3) a and c
(4) a, b, c and d

99. Which one from **List - A** is *not* correctly matched with **List - B** ?

List - A

- (1) Nullisomics
(2) Down syndrome
(3) Turner's syndrome
(4) Klinefelter syndrome

List - B

- 2n-1
Trisomy (47) with extra copy of chromosome 13
Monosomy (45) of XO type
Trisomy (47) of XXY type

100. Acetyl-CoA formed from pyruvate can be used for the synthesis of all of the following except :

- (1) Glucose
(2) Fatty acids
(3) Cholesterol
(4) Steroid hormones

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5. The T-cell receptor link to MHC/peptide is enhanced by interaction between MHC class II on the antigen-presenting cells with the following molecule on the T - cell :
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 - (2) CD4
 - (3) CD8
 - (4) CD28
6. An example of an anti-apoptotic molecule is :
 - (1) Caspase 8
 - (2) Bax
 - (3) BCL-2
 - (4) TRAIL
7. In celiac disease, there is T - cell sensitivity to :
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(3) Asparagine (4) Isoleucine
20. Conjugation between an F^+ and an F^- cell usually results in :
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(3) An F^+ and an F^- cell (4) An Hfr cell and an E^+ cell

21. Match the items in Column - I with those in Column - II :

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- (B) Palynology
- (C) Dendrochronology
- (D) Quiescent centre

- (1) A-d, B-c, C-a, D-b
- (3) A-b, B-a, C-c D-d

Column - II

- (a) Annual rings
- (b) Root
- (c) Pollen
- (d) Monocot

- (2) A-d, B-a, C-b, D-c
- (4) A-c, B-d, C-a, D-b

22. The half-life of radioactive ^{35}S is :

(1) 8.7 days

(2) 14 days

(3) 87 days

(4) 164 days

23. As we move from one geographical region to next neighbouring region, species diversity tends to change. It is termed as :

(1) α -diversity

(2) β -diversity

(3) γ -diversity

(4) δ -diversity

24. The fluid mosaic model of plasma membrane given by Sanger and Nicolson is applicable to:

(1) Only prokaryotic membrane

(2) Only eukaryotic membrane

(3) Both prokaryotic and eukaryotic membranes

(4) Only to organelle membranes

25. Which one of the followings get activated by diacylglycerol (DAG)

(1) MAP kinase

(2) Tyrosine kinase

(3) Protein kinase A

(4) Protein kinase C

26. Activation of a gene is marked by :

(1) Phosphorylation

(2) Acetylation

(3) Methylation

(4) Myristoylation

27. Siderophores are :

(a) Make complex with Fe^{3+}

(b) Help in Iron transport

(c) Secreted by microbes

(d) Contain heme prosthetic group

(1) a, b and c

(2) c and d

(3) a and c

(4) a, b, c and d

28. Cell cycle is controlled by :
- Cyclin synthesis and degradation
 - Phosphorylation of cyclin dependent kinases
 - Binding to CDK inhibitor proteins
 - Dephosphorylation of cyclin dependent kinases
- a and b
 - c and d
 - a and c
 - a, b, c and d
29. Which one from List - A is *not* correctly matched with List - B ?
- | List -A | List - B |
|---------------------------|---|
| (1) Nullisomics | 2n-1 |
| (2) Down syndrome | Trisomy (47) with extra copy of chromosome 13 |
| (3) Turner's syndrome | Monosomy (45) of XO type |
| (4) Klinnefelter syndrome | Trisomy (47) of XXY type |
30. Acetyl-CoA formed from pyruvate can be used for the synthesis of all of the following except :
- Glucose
 - Fatty acids
 - Cholesterol
 - Steroid hormones
31. The toxicity of which one of the following metals is a major limitation to crop production on acidic soils :
- Boron
 - Aluminium
 - Zinc
 - Iron
32. Stem cell number in shoot apical meristem is maintained by the activity of :
- WUS (WUESCHEL)
 - AP2 (APETALA)
 - LFY (LEAFY)
 - CAL (CAULIFLOWER)
33. Chemically, artemisinin, a potent antimalarial drug is a :
- Sesquiterpene lactone
 - Monoterpene lactone
 - Diterpene lactone
 - Triterpene lactone
34. Which one of the following is an anticancer agent ?
- Taxol
 - Camptothecin
 - Vinblastine
 - Vincristine
- a only
 - b only
 - a, c and d only
 - All of them
35. Which one of the following transporters are used to transport xenobiotics from the cytoplasm into the vacuole ?
- Aquaporin
 - ABC transporters
 - 14-3-3 proteins
 - It is a passive transport

36. Cobalt is a part of :
- (1) Vitamin B₁₂ (2) Vitamin B₉
(3) Vitamin B₁ (4) Vitamin B₆
37. Purified duplex DNA molecules cannot exist in which of the one of the following forms ?
- (1) Linear (2) Circular and supercoiled
(3) Circular and relaxed (4) Linear & supercoiled
38. Which class of immunoglobulins will increase in case of a chronic infection ?
- (1) IgA (2) IgG (3) IgM (4) IgE
39. In which molecule would the radiolabel appear the earliest when wheat and sugarcane leaves are fed with ¹⁴CO₂ ?
- (1) Wheat-malate, Sugarcane-3-Phosphoglycerate
(2) Wheat-aspartate, Sugarcane-malate
(3) Wheat-3-phosphoglycerate, Sugarcane-3-phosphoglycerate
(4) Wheat-3-phosphoglycerate, Sugarcane-malate
40. When the velocity of an enzyme reaction is half of V_{max} :
- (1) Substrate concentration is half of K_m
(2) Substrate concentration is equal to K_m
(3) Substrate concentration is twice the K_m
(4) Substrate concentration is far above the K_m
41. Two plants with white flowers are crossed. White flowers arise due to recessive mutation. All F₁ progeny have red flowers. When F₁ plants are selfed, both red and white flowered progeny are observed. In what ratio will red flowered plants and white flowered plants occur ?
- (1) 1 : 1 (2) 3 : 1 (3) 9 : 7 (4) 15 : 1
42. *Cephaleuros* is :
- (1) An endophytic alga (2) A parasitic alga
(3) A freshwater alga (4) A lithophytic alga
43. Telomerase is an enzyme whose macromolecular composition is :
- (1) Ribonucleic acid (2) Lipoprotein
(3) Ribonucleoprotein (4) Protein only
44. The small size of the *Arabidopsis thaliana* genome makes it feasible to construct complete physical maps for all :
- (1) 5 chromosomes (2) 10 chromosomes
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45. Which one of the following techniques will you use to identify more than 1000 differentially expressed genes in normal and tumor tissues in one single experiment ?
- (1) RAPD (2) Genome sequencing
(3) CHIP assay (4) Transcriptome analysis
46. Which of the following microbe is used as biopesticide :
- (1) *Agrobacterium tumefaciens* (2) *Bacillus thuringiensis*
(3) *Agrobacterium rhizogenes* (4) *Bacillus amyloliquefaciens*
47. Which of the following combination of molecular markers is PCR based ?
- (1) RFLP, SSR, RAPD (2) RFLP, AFLP, SSR
(3) AFLP, RAPD, SSR (4) RAPD, RFLP, AFLP
48. The amino-terminal residue of a protein is identified by :
- (1) Fluorodinitro benzene (2) Phenyl isothiocyanate
(3) Dabsyl Chloride (4) All of them
49. The two most common processes that lead to production of multiple functional proteins from the same DNA sequence are:
- (1) RNA editing and alternative editing
(2) Protein folding and posttranslational covalent modification
(3) Alternative editing and posttranslational covalent modification
(4) Posttranslational covalent modification and transcriptional regulation
50. A woman with normal vision but with colour-blind father marries a colour-blind man. The child of the couple is a boy. This boy :
- (1) may or may not be colour-blind
(2) must be colour-blind
(3) must have normal vision
(4) will be partially colour-blind due to being heterozygous
51. Consumption of raw egg white is injurious to health because it blocks the absorption of :
- (1) Pyridoxine (2) Thiamin (3) Biotin (4) Lipoic acid
52. A polysaccharide composed of fructose units :
- (1) Chitin (2) Cellulose (3) Inulin (4) Glycogen
53. All the followings are omega-6 fatty acids except :
- (1) Linoleic acid (2) α -Linolenic acid
(3) γ -Linolenic acid (4) Arachidonic acid

54. Female *Aedes aegyptii* mosquitos transmit virus that causes which one of the following diseases ?
- (1) Zika fever (2) Chikungunya fever
(3) Dengue fever (4) All of them
55. The El Nino / La Nina-Southern Oscillation (ENSO) is a climate pattern that occurs across Pacific ocean roughly once in :
- (1) 2 years (2) 3 years (3) 4 years (4) 5 years
56. Ozone layer in the atmosphere absorbs only :
- (1) UV -A radiation (2) UV-B radiation
(3) UV - C radiation (4) UV-B and UV-C radiations
57. Amongst the animal groups given below, which one has the highest percentage of endangered species ?
- (1) Insects (2) Mammals
(3) Amphibians (4) Reptiles
58. The pyramid of biomass will be inverted in the ecosystem of :
- (1) Forests (2) Lakes (3) Grassland (4) Desert
59. An example of the species interaction called 'commensalism' is :
- (1) Lichens made up of a fungus and an alga
(2) Hookworms living in the host's gut
(3) Orchid plant growing on the trunk of a tree
(4) Bedbug deriving nourishment from human blood
60. What is the general term used to describe the degradation of pollutants using a biological approach ?
- (1) Biodegradation (2) Bioaugmentation
(3) Bioremediation (4) Biostimulation
61. Depurination refers to :
- (1) Breakage of phosphodiester bonds
(2) breakage of hydrogen bonds
(3) Breakage of β -glycosidic bonds
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(1) DNA polymerase I (2) DNA polymerase II
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(1) Helicase and ATP (2) DNA topoisomerase I
(3) DNA-B protein and ATP (4) Alkali
66. Alternate purine and pyrimidine bases are present in :
(1) A-DNA (2) B-DNA (3) Z-DNA (4) None of the above
67. What do you call to genetically modified plants that do not contain the DNA from other species ?
(1) Transgenic plant (2) Cisgenic plant
(3) Transplastomic plant (4) Autogenic plant
68. Name the technique used to determine the copy number of a transgene in the genome of a transgenic plant or animal ?
(1) Northern blotting (2) Western blotting
(3) Southern blotting (4) All of the above
69. Which of the following is *not* a technique to analyze protein-protein interaction ?
(1) Yeast two-hybrid (2) Yeast one-hybrid
(3) Pull-down assay (4) BiFC
70. Which one of the followings is used in genome editing ?
(1) TALENs (2) ZFNs
(3) CRISPR-Cas (4) All of the above
71. Non-competitive inhibitors :
(1) Increase the K_m (2) Decrease the K_m
(3) Increase the V_{max} (4) Decrease the V_{max}
72. Which technique is used to visualize the distribution of proteins in membrane ?
(1) Freeze-fracture technique (2) FRAP
(3) Scanning electron microscopy (4) Atomic force microscopy

73. p53 gene is
- (1) A proto-oncogene (2) An oncogene
(3) A tumour suppressor gene (4) None of the above
74. Which one of the following is the correct sequence of the movement of e^- during the light dependent reactions of plants from PSII to PSI ?
- (1) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700}
(2) P_{680} -plastocyanin -cytochrome b_6f - plastoquinone- P_{700}
(3) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700}
(4) P_{680} - plastoquinone- plastocyanin -cytochrome b_6f - P_{700}
75. Which of the following pathway occurs in the cytoplasm and do not require the presence of oxygen ?
- (1) Krebs cycle (2) Glycolysis
(3) Pentose-phosphate cycle (4) Electron-transport system
76. Which one of the following microbodies is associated with the conversion of fat to carbohydrates in plants ?
- (1) Lysosomes (2) Peroxisomes
(3) Glyoxysomes (4) Sphaerosomes
77. In higher plants, the reduction of nitrate into ammonia takes place by the combined action of nitrate reductase localized in cytosol and nitrite reductase localized in :
- (1) Cytoplasm (2) Chloroplast
(3) Mitochondria (4) Peroxisomes
78. Which of the following plant hormones use the two-component receptor system for signal transduction ?
- (a) Auxin (b) Gibbrellins
(c) Cytokinin (d) Ethylene
(1) c only (2) c and d
(3) a and b (4) All of them
79. The rhizobial genes responsible for nodule formation are termed *nod* genes. Which one of the following secondary compounds released by legume roots serve as chemo-attractants for the rhizobial symbiont and also regulate the expression of rhizobial *nod* genes?
- (1) Terpenoids (2) Phenolics
(3) Flavonoids (4) Alkaloids

80. Which major wave length of light is responsible for stomatal movement in leaves of well-watered plants grown in natural environment ?
- (1) Red light (2) Blue light
(3) Green light (4) Far-red light

81. Match the following larval forms with the phyla that they occur in :

Larval forms

- (a) Glochidium
(b) Planula
(c) Bipinnaria
(d) Tornaria
(1) a-iv, b-iii, c-ii, d-i
(3) a-iii, b-iv, c-i, d-ii

Phylum

- (i) Echinodermata
(ii) Hemichordate
(iii) Coelenterata
(iv) Mollusca
(2) a-iv, b-iii, c-i, d-ii
(4) a-ii, b-iii, c-i, d-iv

- 82: Match List - 1 correctly with List - 2 :

List - 1

- (i) Planaria
(ii) Earthworm
(iii) Prawn
(iv) Scorpion
(1) I-d, II-c, III-a, IV-b
(3) I-c, II-b, III-d, IV-a

List - 2

- (a) Green gland
(b) Malpighian tubes
(c) Nephridia
(d) Flame Cell
(2) I-b, II-c, III-d, IV-a
(4) I-a, II-d, III-c, IV-b

83. Schizocoel is present in :

- (1) Aschelminthes (2) Arthropoda
(3) Echinodermata (4) Hemichordata

84. The amount of air that move in and out of the lungs, with each normal inspiration and expiration is called :

- (1) Tidal capacity (2) Vital capacity
(3) Tidal volume (4) Residual volume

85. Platyhelminths are described as :

- (1) Flatworms, triploblastic, acoelomate
(2) Flatworms, diploblastic, acoelomate
(3) Flatworms, diploblastic, coelomate
(4) Flatworms, triploblastic, coelomate

86. Basic unit of muscle contraction is :

- (1) Actin (2) Myosin (3) Sarcomere (4) Tropomyosin

87. Floral development is controlled by overlapping expression of 'A' class, 'B' class, and 'C' class genes in different whorls. In Arabidopsis mutant, the flowers had sepal, petal, petal and sepal in four whorls. Mutation in which one of the followings is the cause of the mutant phenotype ?
- (1) 'A' class gene alone (2) 'B' class gene alone
 (3) A and B class genes (4) C class gene alone
88. If an organism is respiring in a bell jar filled with radio-labelled oxygen, the radioactivity will be detected in which product of respiration :
- (1) CO₂ (2) H₂O
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89. HAART strategy is used for the treatment of :
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90. Which of the followings are the characteristics of Gymnosperms ?
- (A) Naked ovules (B) Double Fertilization
 (C) Absence of tracheids (D) Haploid endosperm
- (1) A and D (2) A and B (3) C and D (4) B and C
91. TILLING is a reverse genetic approach used in functional genomics. It involves :
- (1) T-DNA tagging
 (2) Ethyl methane sulphonate mutagenesis
 (3) Transposon/retrotransposon tagging
 (4) Gene silencing using RNA interference
92. Which statement is incorrect about ribozymes ?
- (1) Ribozymes are composed of RNA and protein
 (2) It is the RNA component of the ribozyme which performs catalytic role
 (3) It is the protein component of the ribozyme that performs catalytic role
 (4) Ribozymes cause cleavage and ligation of RNA and DNA and peptide bond formation.
93. An endogenous gene of a plant can be more effectively suppressed by introducing which one of the following sequences ?
- (1) Single stranded sense RNA of the endogenous gene
 (2) Antisense RNA of the endogenous gene
 (3) dsRNA of the endogenous gene
 (4) None of the above

94. RNA polymerase is composed of two α - subunits, one β - subunit, one β' - subunit and one σ subunit. Which one subunit (factor) is involved in initiation of transcription ?
- (1) α -subunit (2) β -subunit
(3) β' -subunit (4) σ -subunit
95. Dideoxynucleotides differ from deoxynucleotides because an additional hydroxyl group is missing from position :
- (1) 5' (2) 1' (3) 2' (4) 3'
96. Arrange the following vectors in ascending order in terms of size of possible inserts :
- (1) BACs, cosmids, plasmids, bacteriophage
(2) Cosmids, bacteriophage, plasmids, BACs
(3) Plasmids, bacteriophage, cosmids, BACs
(4) Bacteriophage, BACs, plasmids, cosmids
97. The operon model, a negative control mechanism was developed in 1961 by :
- (1) Griffith & coworkers (2) Jacob and Monod
(3) Zinder and Lederberg (4) Lederberg and Tatum
98. A virus-free clone from a virus infected plant can be obtained by :
- (1) Protoplast culture (2) Cotyledonary leaf culture
(3) Stem culture (4) Meristem tip culture
99. The lens used in the "objective" of a compound microscope is :
- (1) Convex lens
(2) Concave lens
(3) Combination of convex and concave lens
(4) Plano-convex lens
100. Roll-tube procedure is used to isolate :
- (1) Aerobes (2) Anaerobes
(3) Thermopiles (4) Facultative aerobes

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

M. Phil/Ph.D/URS - EE - Jan.-Dec.-2017

SUBJECT : Life Science



10203

Sr. No.

Time : 1¼ Hours

Max. Marks : 100

Total Questions : 100

Roll No. (in figures) _____ (in words) _____

Name _____ Father's Name _____

Mother's Name _____ Date of Examination _____

(Signature of the Candidate)

(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.**
- The candidates **must return** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
- The candidate **must not** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers **must not** be ticked in the question booklet.
- There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
- Use only **Black or Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
- Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.**

M.Phil/Ph.D/URS-EE-Jan.-Dec.-2017/(Life Sci.)/(C)

SEAL

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 - (1) Breakage of phosphodiester bonds
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 - (3) Breakage of β -glycosidic bonds
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(b) Planula	(ii) Hemichordate
(c) Bipinnaria	(iii) Coelenterata
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 - (C) Absence of tracheids
 - (D) Haploid endosperm
- (1) A and D
 - (2) A and B
 - (3) C and D
 - (4) B and C
31. The wings of insects and wings of bats represent a case of :
- (1) Divergent evolution
 - (2) Co-evolution
 - (3) Parallel evolution
 - (4) Convergent evolution
32. Which of the following is *not* useful for phylogenetic analysis of human populations ?
- (1) Ribosomal RNA genes
 - (2) Mitochondrial DNA
 - (3) Microsatellites
 - (4) Multiallelic genes
33. During which geological period was there the maximum diversity of reptiles ?
- (1) Jurassic
 - (2) Triassic
 - (3) Cretaceous
 - (4) Permian

34. Who proposed the most widely accepted scientific theory of the 'Origin of Life' ?
(1) Charles Darwin (2) Oparin and Haldane
(3) Miller and Urey (4) Laderberg and Tatum
35. Hardy-Weinberg genetic equilibrium holds good for :
(1) Panmictic population (2) Mendelian population
(3) Assortative mating population (4) Dissortative mating population
36. A pregnant human female excretes :
(1) HCG (2) FSH (3) LH (4) Progesterone
37. The process of gastrulation in amphibian embryo starts from the dorsal lip of blastopore by :
(1) Involution (2) Ebiboly (3) Delamination (4) Evagination
38. Glucagon hormone is secreted by :
(1) β -cells of islets of langerhans (2) α -cells of islets of langerhans
(3) δ -cells of islets of langerhans (4) γ -cells of islets of langerhans
39. Which of the amino acid is encoded by only a single codon :
(1) Glutamine (2) Tryptophan (3) Asparagine (4) Isoleucine
40. Conjugation between an F^+ and an F^- cell usually results in :
(1) Two F^+ cells (2) Two F^- cells
(3) An F^+ and an F^- cell (4) An Hfr cell and an F^+ cell
41. The toxicity of which one of the following metals is a major limitation to crop production on acidic soils :
(1) Boron (2) Aluminium (3) Zinc (4) Iron
42. Stem cell number in shoot apical meristem is maintained by the activity of :
(1) *WUS (WUESCHEL)* (2) *AP2 (APETALA)*
(3) *LFY (LEAFY)* (4) *CAL (CAULIFLOWER)*
43. Chemically, artemisinin, a potent antimalarial drug is a :
(1) Sesquiterpene lactone (2) Monoterpene lactone
(3) Diterpene lactone (4) Triterpene lactone
44. Which one of the following is an anticancer agent ?
(a) Taxol (b) Camptothecin (c) Vinblastine (d) Vincristine
(1) a only (2) b only
(3) a, c and d only (4) All of them

45. Which one of the following transporters are used to transport xenobiotics from the cytoplasm into the vacuole ?
(1) Aquaporin (2) ABC transporters
(3) 14-3-3 proteins (4) It is a passive transport
46. Cobalt is a part of :
(1) Vitamin B₁₂ (2) Vitamin B₉ (3) Vitamin B₁ (4) Vitamin B₆
47. Purified duplex DNA molecules cannot exist in which of the one of the following forms ?
(1) Linear (2) Circular and supercoiled
(3) Circular and relaxed (4) Linear & supercoiled
48. Which class of immunoglobulins will increase in case of a chronic infection ?
(1) IgA (2) IgG (3) IgM (4) IgE
49. In which molecule would the radiolabel appear the earliest when wheat and sugarcane leaves are fed with ¹⁴CO₂ ?
(1) Wheat-malate, Sugarcane-3-Phosphoglycerate
(2) Wheat-aspartate, Sugarcane-malate
(3) Wheat-3-phosphoglycerate, Sugarcane-3-phosphoglycerate
(4) Wheat-3-phosphoglycerate, Sugarcane-malate
50. When the velocity of an enzyme reaction is half of V_{max} :
(1) Substrate concentration is half of K_m
(2) Substrate concentration is equal to K_m
(3) Substrate concentration is twice the K_m
(4) Substrate concentration is far above the K_m
51. TILLING is a reverse genetic approach used in functional genomics. It involves :
(1) T-DNA tagging
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- (1) Single stranded sense RNA of the endogenous gene
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 - (3) dsRNA of the endogenous gene
 - (4) None of the above
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 - (3) β' -subunit
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- (1) 5'
 - (2) 1'
 - (3) 2'
 - (4) 3'
56. Arrange the following vectors in ascending order in terms of size of possible inserts :
- (1) BACs, cosmids, plasmids, bacteriophage
 - (2) Cosmids, bacteriophage, plasmids, BACs
 - (3) Plasmids, bacteriophage, cosmids, BACs
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60. Roll-tube procedure is used to isolate :
- (1) Aerobes
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 - (3) Thermopiles
 - (4) Facultative aerobes

61. Non-competitive inhibitors :
- | | |
|----------------------------|----------------------------|
| (1) Increase the K_m | (2) Decrease the K_m |
| (3) Increase the V_{max} | (4) Decrease the V_{max} |
62. Which technique is used to visualize the distribution of proteins in membrane ?
- | | |
|----------------------------------|-----------------------------|
| (1) Freeze-fracture technique | (2) FRAP |
| (3) Scanning electron microscopy | (4) Atomic force microscopy |
63. p53 gene is
- | | |
|------------------------------|-----------------------|
| (1) A proto-oncogene | (2) An oncogene |
| (3) A tumour suppressor gene | (4) None of the above |
64. Which one of the following is the correct sequence of the movement of e^- during the light dependent reactions of plants from PSII to PSI ?
- (1) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700}
 - (2) P_{680} -plastocyanin -cytochrome b_6f - plastoquinone- P_{700}
 - (3) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700}
 - (4) P_{680} - plastoquinone- plastocyanin -cytochrome b_6f - P_{700}
65. Which of the following pathway occurs in the cytoplasm and do not require the presence of oxygen ?
- | | |
|-----------------------------|-------------------------------|
| (1) Krebs cycle | (2) Glycolysis |
| (3) Pentose-phosphate cycle | (4) Electron-transport system |
66. Which one of the following microbodies is associated with the conversion of fat to carbohydrates in plants ?
- | | | | |
|---------------|-----------------|-----------------|-----------------|
| (1) Lysosomes | (2) Peroxisomes | (3) Glyoxysomes | (4) Spherosomes |
|---------------|-----------------|-----------------|-----------------|
67. In higher plants, the reduction of nitrate into ammonia takes place by the combined action of nitrate reductase localized in cytosol and nitrite reductase localized in :
- | | | | |
|---------------|-----------------|------------------|-----------------|
| (1) Cytoplasm | (2) Chloroplast | (3) Mitochondria | (4) Peroxisomes |
|---------------|-----------------|------------------|-----------------|
68. Which of the following plant hormones use the two-component receptor system for signal transduction ?
- | | | | |
|------------|-----------------|---------------|-----------------|
| (a) Auxin | (b) Gibbrellins | (c) Cytokinin | (d) Ethylene |
| (1) c only | (2) c and d | (3) a and b | (4) All of them |
69. The rhizobial genes responsible for nodule formation are termed *nod* genes. Which one of the following secondary compounds released by legume roots serve as chemo-attractants for the rhizobial symbiont and also regulate the expression of rhizobial *nod* genes?
- | | | | |
|----------------|---------------|----------------|---------------|
| (1) Terpenoids | (2) Phenolics | (3) Flavonoids | (4) Alkaloids |
|----------------|---------------|----------------|---------------|

70. Which major wave length of light is responsible for stomatal movement in leaves of well-watered plants grown in natural environment ?
- (1) Red light (2) Blue light
(3) Green light (4) Far-red light
71. Rhodotorula is used to produce :
- (1) Organic acids (2) Antibiotics
(3) Lipids (4) Amino acids
72. Microorganisms indigenous to a particular environment are :
- (1) Autochthonous (2) Allochthonous
(3) Zygotogenous (4) Autogenous
73. Rickettsias are commonly transmitted through :
- (1) Air (2) Water
(3) Soil (4) Arthropod vectors
74. Which immunoglobulin class crosses the placenta to provide a high level of passive immunity at birth ?
- (1) IgA (2) IgE (3) IgG (4) IgM
75. The T-cell receptor link to MHC/peptide is enhanced by interaction between MHC class II on the antigen-presenting cells with the following molecule on the T - cell :
- (1) CD2 (2) CD4 (3) CD8 (4) CD28
76. An example of an anti-apoptotic molecule is :
- (1) Caspase 8 (2) Bax (3) BCL-2 (4) TRAIL
77. In celiac disease, there is T - cell sensitivity to :
- (1) Myelin basic protein
(2) Gluten
(3) Gastric $H^+ - K^+$ dependent ATPase
(4) β -adrenergic receptors
78. Antigen in tissues can be localized with fluorescent antibodies using :
- (1) Flow cytometry
(2) Confocal fluorescence microscope
(3) The electron microscope
(4) An enzyme substrate

79. A haptén is :
- (1) An epitope
 - (2) A carrier
 - (3) An immunogen
 - (4) A small chemical grouping which reacts with preformed antibodies
80. BCG is used to protect against :
- (1) Tuberculosis
 - (2) Pertussis
 - (3) Hepatitis B
 - (4) Influenza
81. Match the items in **Column - I** with those in **Column - II** :
- | Column - I | Column - II |
|------------------------|------------------------|
| (A) Scutellum | (a) Annual rings |
| (B) Palynology | (b) Root |
| (C) Dendrochronology | (c) Pollen |
| (D) Quiescent centre | (d) Monocot |
| (1) A-d, B-c, C-a, D-b | (2) A-d, B-a, C-b, D-c |
| (3) A-b, B-a, C-c, D-d | (4) A-c, B-d, C-a, D-b |
82. The half-life of radioactive ^{35}S is :
- (1) 8.7 days
 - (2) 14 days
 - (3) 87 days
 - (4) 164 days
83. As we move from one geographical region to next neighbouring region, species diversity tends to change. It is termed as :
- (1) α -diversity
 - (2) β -diversity
 - (3) γ -diversity
 - (4) δ -diversity
84. The fluid mosaic model of plasma membrane given by Sanger and Nicolson is applicable to:
- (1) Only prokaryotic membrane
 - (2) Only eukaryotic membrane
 - (3) Both prokaryotic and eukaryotic membranes
 - (4) Only to organelle membranes
85. Which one of the followings get activated by diacylglycerol (DAG)
- (1) MAP kinase
 - (2) Tyrosine kinase
 - (3) Protein kinase A
 - (4) Protein kinase C
86. Activation of a gene is marked by :
- (1) Phosphorylation
 - (2) Acetylation
 - (3) Methylation
 - (4) Myristoylation

94. Female *Aedes aegyptii* mosquitos transmit virus that causes which one of the following diseases ?
- (1) Zika fever (2) Chikungunya fever
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97. Amongst the animal groups given below, which one has the highest percentage of endangered species ?
- (1) Insects (2) Mammals
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98. The pyramid of biomass will be inverted in the ecosystem of :
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99. An example of the species interaction called 'commensalism' is :
- (1) Lichens made up of a fungus and an alga
(2) Hookworms living in the host's gut
(3) Orchid plant growing on the trunk of a tree
(4) Bedbug deriving nourishment from human blood
100. What is the general term used to describe the degradation of pollutants using a biological approach ?
- (1) Biodegradation (2) Bioaugmentation
(3) Bioremediation (4) Biostimulation

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU
ARE ASKED TO DO SO)

M. Phil/Ph.D/URS - EE - Jan.-Dec.-2017

SUBJECT : Life Science

D

Sr. No. **10208**

Time : **1¼ Hours**

Max. Marks : **100**

Total Questions : **100**

Roll No. (in figures) _____ (in words) _____

Name _____ Father's Name _____

Mother's Name _____ Date of Examination _____

(Signature of the Candidate)

(Signature of the Invigilator)

**CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE
STARTING THE QUESTION PAPER.**

1. **All questions are compulsory.**
2. The candidates **must return** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing **within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate **must not** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers **must not** be ticked in the question booklet.
5. **There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
6. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
7. **Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.**

M.Phil/Ph.D/URS-EE-Jan.-Dec.-2017/(Life Sci.)/(D)

SEAL

1. Match the items in **Column - I** with those in **Column - II** :

Column - I

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(B) Palynology
(C) Dendrochronology
(D) Quiescent centre

Column - II

- (a) Annual rings
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(c) Pollen
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6. Activation of a gene is marked by :

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7. Siderophores are :

- (a) Make complex with Fe^{3+}
(b) Help in Iron transport
(c) Secreted by microbes
(d) Contain heme prosthetic group
(1) a, b and c (2) c and d (3) a and c (4) a, b, c and d

8. Cell cycle is controlled by :
- (a) Cyclin synthesis and degradation
 - (b) Phosphorylation of cyclin dependent kinases
 - (c) Binding to CDK inhibitor proteins
 - (d) Dephosphorylation of cyclin dependent kinases
- (1) a and b (2) c and d (3) a and c (4) a, b, c and d
9. Which one from List - A is *not* correctly matched with List - B ?
- | List -A | List - B |
|---------------------------|---|
| (1) Nullisomics | 2n-1 |
| (2) Down syndrome | Trisomy (47) with extra copy of chromosome 13 |
| (3) Turner's syndrome | Monosomy (45) of XO type |
| (4) Klinnefelter syndrome | Trisomy (47) of XXY type |
10. Acetyl-CoA formed from pyruvate can be used for the synthesis of all of the following except :
- (1) Glucose
 - (2) Fatty acids
 - (3) Cholesterol
 - (4) Steroid hormones
11. TILLING is a reverse genetic approach used in functional genomics. It involves :
- (1) T-DNA tagging
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(2) Cosmids, bacteriophage, plasmids, BACs
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(4) Plano-convex lens
20. Roll-tube procedure is used to isolate :
- (1) Aerobes (2) Anaerobes (3) Thermopiles (4) Facultative aerobes
21. The wings of insects and wings of bats represent a case of :
- (1) Divergent evolution (2) Co-evolution
(3) Parallel evolution (4) Convergent evolution
22. Which of the following is *not* useful for phylogenetic analysis of human populations ?
- (1) Ribosomal RNA genes (2) Mitochondrial DNA
(3) Microsatellites (4) Multiallelic genes

33. If DNA sequence is ATG then what would be the sequence of bases in anticodon of tRNA ?
(1) ATG (2) UAC (3) TAC (4) AUG
34. During prokaryotic DNA replication, the RNA primers are degraded by the 5' to 3' exonuclease activity of :
(1) DNA polymerase I (2) DNA polymerase II
(3) DNA polymerase III (4) Topoisomerase II
35. From a DNA-RNA hybrid, DNA can be obtained by addition of:
(1) Helicase and ATP (2) DNA topoisomerase I
(3) DNA-B protein and ATP (4) Alkali
36. Alternate purine and pyrimidine bases are present in :
(1) A-DNA (2) B-DNA (3) Z-DNA (4) None of the above
37. What do you call to genetically modified plants that do not contain the DNA from other species ?
(1) Transgenic plant (2) Cisgenic plant
(3) Transplastomic plant (4) Autogenic plant
38. Name the technique used to determine the copy number of a transgene in the genome of a transgenic plant or animal ?
(1) Northern blotting (2) Western blotting
(3) Southern blotting (4) All of the above
39. Which of the following is *not* a technique to analyze protein-protein interaction ?
(1) Yeast two-hybrid (2) Yeast one-hybrid
(3) Pull-down assay (4) BiFC
40. Which one of the followings is used in genome editing ?
(1) TALENs (2) ZFNs (3) CRISPR-Cas (4) All of the above
41. Consumption of raw egg white is injurious to health because it blocks the absorption of :
(1) Pyridoxine (2) Thiamin (3) Biotin (4) Lipoic acid
42. A polysaccharide composed of fructose units :
(1) Chitin (2) Cellulose (3) Inulin (4) Glycogen
43. All the followings are omega-6 fatty acids except :
(1) Linoleic acid (2) α -Linolenic acid
(3) γ -Linolenic acid (4) Arachidonic acid

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 (3) Bioremediation (4) Biostimulation
51. Match the following larval forms with the phyla that they occur in :
- | Larval forms | Phylum |
|----------------------------|----------------------------|
| (a) Glochidium | (i) Echinodermata |
| (b) Planula | (ii) Hemichordate |
| (c) Bipinnaria | (iii) Coelenterata |
| (d) Tornaria | (iv) Mollusca |
| (1) a-iv, b-iii, c-ii, d-i | (2) a-iv, b-iii, c-i, d-ii |
| (3) a-iii, b-iv, c-i, d-ii | (4) a-ii, b-iii, c-i, d-iv |

52. Match List - 1 correctly with List - 2 :

List - 1

- (i) Planaria
- (ii) Earthworm
- (iii) Prawn
- (iv) Scorpion
- (1) I-d, II-c, III-a, IV-b
- (3) I-c, II-b, III-d, IV-a

List - 2

- (a) Green gland
- (b) Malpighian tubes
- (c) Nephridia
- (d) Flame Cell
- (2) I-b, II-c, III-d, IV-a
- (4) I-a, II-d, III-c, IV-b

53. Schizocoel is present in :

- (1) Aschelminthes (2) Arthropoda (3) Echinodermata (4) Hemichordata

54. The amount of air that move in and out of the lungs, with each normal inspiration and expiration is called :

- (1) Tidal capacity (2) Vital capacity
- (3) Tidal volume (4) Residual volume

55. Platyhelminths are described as :

- (1) Flatworms, triploblastic, acoelomate
- (2) Flatworms, diploblastic, acoelomate
- (3) Flatworms, diploblastic, coelomate
- (4) Flatworms, triploblastic, coelomate

56. Basic unit of muscle contraction is :

- (1) Actin (2) Myosin (3) Sarcomere (4) Tropomyosin

57. Floral development is controlled by overlapping expression of 'A' class, 'B' class, and 'C' class genes in different whorls. In Arabidopsis mutant, the flowers had sepal, petal, petal and sepal in four whorls. Mutation in which one of the followings is the cause of the mutant phenotype ?

- (1) 'A' class gene alone (2) 'B' class gene alone
- (3) A and B class genes (4) C class gene alone

58. If an organism is respiring in a bel jar filled with radio-labelled oxygen, the radioactivity will be detected in which product of respiration :

- (1) CO₂ (2) H₂O (3) CO₂ and H₂O (4) C₆H₁₂O₆

59. HAART strategy is used for the treatment of :

- (1) Hepatitis B (2) Syphilis
- (3) AIDS (4) Hepatitis C

60. Which of the followings are the characteristics of Gymnosperms ?
(A) Naked ovules
(B) Double Fertilization
(C) Absence of tracheids
(D) Haploid endosperm
(1) A and D
(2) A and B
(3) C and D
(4) B and C
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(4) β -adrenergic receptors
68. Antigen in tissues can be localized with fluorescent antibodies using :
(1) Flow cytofluorimetry
(2) Confocal fluorescence microscope
(3) The electron microscope
(4) An enzyme substrate

69. A hapten is :
- (1) An epitope
 - (2) A carrier
 - (3) An immunogen
 - (4) A small chemical grouping which reacts with preformed antibodies
70. BCG is used to protect against :
- (1) Tuberculosis
 - (2) Pertussis
 - (3) Hepatitis B
 - (4) Influenza
71. Two plants with white flowers are crossed. White flowers arise due to recessive mutation. All F₁ progeny have red flowers. When F₁ plants are selfed, both red and white flowered progeny are observed. In what ratio will red flowered plants and white flowered plants occur ?
- (1) 1 : 1
 - (2) 3 : 1
 - (3) 9 : 7
 - (4) 15 : 1
72. *Cephaleuros* is :
- (1) An endophytic alga
 - (2) A parasitic alga
 - (3) A freshwater alga
 - (4) A lithophytic alga
73. Telomerase is an enzyme whose macromolecular composition is :
- (1) Ribonucleic acid
 - (2) Lipoprotein
 - (3) Ribonucleoprotein
 - (4) Protein only
74. The small size of the *Arabidopsis thaliana* genome makes it feasible to construct complete physical maps for all :
- (1) 5 chromosomes
 - (2) 10 chromosomes
 - (3) 15 chromosomes
 - (4) 21 chromosomes
75. Which one of the following techniques will you use to identify more than 1000 differentially expressed genes in normal and tumor tissues in one single experiment ?
- (1) RAPD
 - (2) Genome sequencing
 - (3) CHIP assay
 - (4) Transcriptome analysis
76. Which of the following microbe is used as biopesticide :
- (1) *Agrobacterium tumefaciens*
 - (2) *Bacillus thuringiensis*
 - (3) *Agrobacterium rhizogenes*
 - (4) *Bacillus amyloliquefaciens*
77. Which of the following combination of molecular markers is PCR based ?
- (1) RFLP, SSR, RAPD
 - (2) RFLP, AFLP, SSR
 - (3) AFLP, RAPD, SSR
 - (4) RAPD, RFLP, AFLP

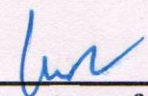
78. The amino-terminal residue of a protein is identified by :
- (1) Fluorodinitro benzene
 - (2) Phenyl isothiocyanate
 - (3) Dabsyl Chloride
 - (4) All of them
79. The two most common processes that lead to production of multiple functional proteins from the same DNA sequence are:
- (1) RNA editing and alternative editing
 - (2) Protein folding and posttranslational covalent modification
 - (3) Alternative editing and posttranslational covalent modification
 - (4) Posttranslational covalent modification and transcriptional regulation
80. A woman with normal vision but with colour-blind father marries a colour-blind man. The child of the couple is a boy. This boy :
- (1) may or may not be colour-blind
 - (2) must be colour-blind
 - (3) must have normal vision
 - (4) will be partially colour-blind due to being heterozygous
81. The toxicity of which one of the following metals is a major limitation to crop production on acidic soils :
- (1) Boron
 - (2) Aluminium
 - (3) Zinc
 - (4) Iron
82. Stem cell number in shoot apical meristem is maintained by the activity of :
- (1) *WUS (WUESCHEL)*
 - (2) *AP2 (APETALA)*
 - (3) *LFY (LEAFY)*
 - (4) *CAL (CAULIFLOWER)*
83. Chemically, artemisinin, a potent antimalarial drug is a :
- (1) Sesquiterpene lactone
 - (2) Monoterpene lactone
 - (3) Diterpene lactone
 - (4) Triterpene lactone
84. Which one of the following is an anticancer agent ?
- (a) Taxol
 - (b) Camptothecin
 - (c) Vinblastine
 - (d) Vincristine
- (1) a only
 - (2) b only
 - (3) a, c and d only
 - (4) All of them
85. Which one of the following transporters are used to transport xenobiotics from the cytoplasm into the vacuole ?
- (1) Aquaporin
 - (2) ABC transporters
 - (3) 14-3-3 proteins
 - (4) It is a passive transport

86. Cobalt is a part of :
- (1) Vitamin B₁₂ (2) Vitamin B₉
(3) Vitamin B₁ (4) Vitamin B₆
87. Purified duplex DNA molecules cannot exist in which of the one of the following forms ?
- (1) Linear (2) Circular and supercoiled
(3) Circular and relaxed (4) Linear & supercoiled
88. Which class of immunoglobulins will increase in case of a chronic infection ?
- (1) IgA (2) IgG (3) IgM (4) IgE
89. In which molecule would the radiolabel appear the earliest when wheat and sugarcane leaves are fed with ¹⁴CO₂ ?
- (1) Wheat-malate, Sugarcane-3-Phosphoglycerate
(2) Wheat-aspartate, Sugarcane-malate
(3) Wheat-3-phosphoglycerate, Sugarcane-3-phosphoglycerate
(4) Wheat-3-phosphoglycerate, Sugarcane-malate
90. When the velocity of an enzyme reaction is half of V_{max} :
- (1) Substrate concentration is half of K_m
(2) Substrate concentration is equal to K_m
(3) Substrate concentration is twice the K_m
(4) Substrate concentration is far above the K_m
91. Non-competitive inhibitors :
- (1) Increase the K_m (2) Decrease the K_m
(3) Increase the V_{max} (4) Decrease the V_{max}
92. Which technique is used to visualize the distribution of proteins in membrane ?
- (1) Freeze-fracture technique (2) FRAP
(3) Scanning electron microscopy (4) Atomic force microscopy
93. p53 gene is
- (1) A proto-oncogene (2) An oncogene
(3) A tumour suppressor gene (4) None of the above

94. Which one of the following is the correct sequence of the movement of e^- during the light dependent reactions of plants from PSII to PSI ?
- (1) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700}
 - (2) P_{680} -plastocyanin -cytochrome b_6f - plastoquinone- P_{700}
 - (3) P_{680} - plastoquinone-cytochrome b_6f - plastocyanin- P_{700}
 - (4) P_{680} - plastoquinone- plastocyanin -cytochrome b_6f - P_{700}
95. Which of the following pathway occurs in the cytoplasm and do not require the presence of oxygen ?
- (1) Krebs cycle
 - (2) Glycolysis
 - (3) Pentose-phosphate cycle
 - (4) Electron-transport system
96. Which one of the following microbodies is associated with the conversion of fat to carbohydrates in plants ?
- (1) Lysosomes
 - (2) Peroxisomes
 - (3) Glyoxysomes
 - (4) Spherosomes
97. In higher plants, the reduction of nitrate into ammonia takes place by the combined action of nitrate reductase localized in cytosol and nitrite reductase localized in :
- (1) Cytoplasm
 - (2) Chloroplast
 - (3) Mitochondria
 - (4) Peroxisomes
98. Which of the following plant hormones use the two-component receptor system for signal transduction ?
- | | | | |
|-------------|-----------------|-----------------|--------------|
| (a) Auxin | (b) Gibbrellins | (c) Cytokinin | (d) Ethylene |
| (1) c only | | (2) c and d | |
| (3) a and b | | (4) All of them | |
99. The rhizobial genes responsible for nodule formation are termed *nod* genes. Which one of the following secondary compounds released by legume roots serve as chemo-attractants for the rhizobial symbiont and also regulate the expression of rhizobial *nod* genes?
- (1) Terpenoids
 - (2) Phenolics
 - (3) Flavonoids
 - (4) Alkaloids
100. Which major wave length of light is responsible for stomatal movement in leaves of well-watered plants grown in natural environment ?
- (1) Red light
 - (2) Blue light
 - (3) Green light
 - (4) Far-red light

ANSWER - KEY

1	2	3	4	5	6	7	8	9	10
2	1	1	4	2	1	4	2	4	2
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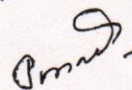
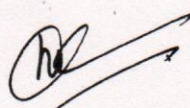

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PH.D/URS (LIFE SCIENCES)

PAGE: 2

SET : B

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PH.D/URS (LIFE SCIENCES)

PAGE: 3

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WVY

Prade

PH.D/URS (LIFE SCIENCES)

PAGE: 4

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7. 1	22. 1	37. 2	52. 1	67. 2	82. 1	97. 2
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14. 4	29. 2	44. 4	59. 3	74. 1	89. 4	
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P. Prasad