



**Ramakrishna Mission
Vivekananda Educational and Research Institute**

(Declared by Govt of India under Section 3 of UGC Act, 1956)

School of Agriculture and Rural Development

Faculty Centre for

INTEGRATED RURAL DEVELOPMENT & MANAGEMENT (IRDM)

Ramakrishna Mission Ashrama, Narendrapur, Kolkata: 700 103

Course: M.Sc. in Agricultural Biotechnology (AgBT)

Entrance Examination 2017

Date: 10. 06. 2017

Time: 1 hour

Full Marks: 60

Important Instructions

1. Section-A is compulsory.
2. Answer any two of the five Groups (I, II, III, IV and V) under Section-B.
3. For answering Multiple Choice Questions in any group, underline the correct answer in the question paper itself.
4. Use extra sheet (to be provided) for Section-B in case of Group-I to V.

Name of the Candidate : _____

Registration No. : _____

B. Sc. in : _____

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| Group | Max. Marks | Marks Obtained |
|--|------------|----------------|
| <u>Section-A</u>: Basics of General Sciences | 20 | |
| <u>Section-B</u>: Subject Test (any <u>two</u> of the following groups) | 40 | |
| Group-I: Botany | | |
| Group-II: Zoology | | |
| Group-III: Microbiology | | |
| Group-IV: Biochemistry | | |
| Group-V: Biotechnology | | |
| TOTAL | 60 | |

Section A: Basics in General Sciences

Underline the correct answer. Each question carries 1 mark. There will be no negative marking for wrong answers.

1. 'Central dogma of Biology' was put forward by

- a) Watson
- b) Crick
- c) Temin
- d) Khorana

2. The enzyme required for transcription is

- a) Restriction enzymes
- b) DNA polymerase
- c) RNA polymerase
- d) RNAase

3. Which one is not a part of chloroplasts?

- a) thylakoid
- b) matrix
- c) stroma
- d) granum

4. Which one of the following is not a nitrogenous fertilizer?

- a) Muriate of Potash
- b) Potassium nitrate
- c) Ammonium nitrate
- d) Urea

5. Soil reaction or pH is the

- a) negative logarithm of H^+ ion concentration in soil solution.
- b) logarithm of H^+ ion concentration in soil solution.
- c) activity of OH^- ion in soil solution in the soil.
- d) All of the above

6. Which of the followings is a trace element?

- a) Ca
- b) K
- c) Mg
- d) Cu

7. During photosynthesis the oxygen in glucose comes from

- a) water
- b) Carbon di-oxide
- c) O₂ from air
- d) Both a & b

8. The radioisotope of uranium (${}_{92}\text{U}^{238}$) is transmuted in to an isotope of thorium (${}_{90}\text{Th}^{234}$) with release of

- a) α -particle
- b) β -particle
- c) γ -particle
- d) Both a & b

9. Conversion of 1 nm to 1 μm

- a) multiply by 1000
- b) divide by 1000
- c) multiply by 100
- d) divide by 100

10. What will be the resistance of a 100 W, 220 V electric bulb?

- a) 2.2
- b) 440
- c) 488
- d) None of the above

11. According to Lowry and Bronsted theory, an acid tends to

- a) gain a proton
- b) lose a proton
- c) accept an electron
- d) donate an electron

12. Acid anhydrides are formed by the chemical reaction of

- a) two molecules of an alcohol
- b) two molecules of an acid
- c) one molecule of an alcohol and an acid
- d) None of the above

13. The value of $(1-\cos^2\theta)/(1-\sin^2\theta)$ is

- a) $\tan^2\theta$
- b) $\cot^2\theta$
- c) 1
- d) $\cos^2\theta$

14. A chemist dissolves 98.4 g of FeSO_4 in enough water to make 2 litres of solution. What is the molarity of the solution? (MW of FeSO_4 152.0)

- a) 0.65 (M)
- b) 0.32 (M)
- c) 49.2 (M)
- d) None of the above

15. If the radius of a spherical cell is increased by 2 times, its surface area will be

- a) increased by 2 times.
- b) increased by 4 times.
- c) decreased by 2 times.
- d) decreased by 4 times.

16. In the presence of nickel at 120°C temperature, ethanes are produced from ethylene. This reaction can be denoted as

- a) oxidation
- b) reduction
- c) phosphorylation
- d) decarboxylation

17. The value of $(\log_5 25)/(\log_6 36)$ is

- a) 1
- b) 2
- c) 4
- d) 7

18. Light travels fastest through which of the following materials?

- a) diamond
- b) water
- c) glass
- d) air

19. The chemical name of NaN_3 is

- a) Sodium nitride
- b) Sodium tri-nitride
- c) Sodium azide
- d) Sodium tri-azide

20. The value of $(Y^{a-b}) \times (Y^{b-c}) \times (Y^{c-a})$ is

- a) 0
- b) 1
- c) Y
- d) ∞

Area for rough work

Section B: Subject Test

Group-I: Botany

Part I: Underline the correct answer. Each question carries 1 mark. There will be no negative marking for wrong answers.

1. Andrew Fire and Craig Mello got Nobel Prize in medicine for the discovery of

- a) Split genes
- b) Transposons
- c) Ribozymes
- d) RNA interference

2. Transcription is the transfer of genetic information from

- a) DNA to RNA
- b) tRNA to mRNA
- c) DNA to mRNA
- d) mRNA to tRNA

3. The root nodule of legumes contain a pink pigment which has high affinity for oxygen. This pigment is

- a) Nod haemoglobin
- b) Leghaemoglobin
- c) Haemoglobin
- d) Bacterial haemoglobin

4. "Kranz Anatomy" is found in

- a) Flower
- b) Seed
- c) Leaves
- d) Stem

5. Development of a fruit without fertilization is known as

- a) Parthenogenesis
- b) Polyembryony
- c) Budding
- d) Apomixes

6. Excessive use of fertilizer causes death of plants due to

- a) Endosmosis
- b) Exosmosis
- c) Imbibition
- d) Turgidity

7. Pointed gourd is a

- a) monoecious plant
- b) hermaphrodite plant
- c) dioecious plant
- d) polygamous plant

8. If the frequency of aa homozygotes is 0.09, then the allelic frequency of A will be

- a) 0.3
- b) 0.01
- c) 0.7
- d) 0.49

9. Pureline refers to

- a) homozygous and homogeneous
- b) homozygous and heterogeneous
- c) heterozygous and homogeneous
- d) heterozygous and heterogeneous

10. To overcome interspecific hybridization, the following method mostly adapted is

- a) pollen culture
- b) ovule culture
- c) embryo culture
- d) callus culture

Part II: Each question carries 2 marks. Write on separate papers provided at the end of question sheet.

11. Write short note on the any five of the following:

- | | | |
|-----------------|-------------------|------------------|
| a. Osmosis | b. ABA signalling | c. Stomata |
| d. Calvin cycle | e. Bryophyta | f. Plasmodesmata |

Group-II: Zoology

Part I: Underline the correct answer. Each question carries 1 mark. There will be no negative marking for wrong answers.

1. Stanley Prusiner, Nobel winner of 1997 discovered bizarre infectious protein particle called as

- a) Prions
- b) Viroids
- c) Virusoids
- d) Proteomes

2. A promoter is the site on DNA, which

- a) initiates transcription
- b) regulates termination
- c) codes for RNA
- d) transcribes repressor

3. Who discovered lysosomes?

- a) Albert Lehninger
- b) Christian de Duve
- c) Robert Brown
- d) Robert Hook

4. The heavy and light chains of immunoglobulins molecules are joined together by

- a) hydrogen bonds
- b) peptide bonds
- c) di-sulfide bonds
- d) salt bridge formation

5. Sigma factor is a component of

- a) DNA ligase
- b) DNA polymerase
- c) RNA polymerase
- d) Endonuclease

6. In a family, father is normal and mother is having disease and the disease is transmitted to son, not to daughter. This is due to

- a) Sex linked inheritance
- b) Autosomal dominance
- c) Sex limited inheritance
- d) None of the above

7. Diploblastic animals lack

- a) ectoderm
- b) endoderm
- c) mesoderm
- d) None of the above

8. Which of the following is the largest order of class insecta?

- a) Hemiptera
- b) Hymenoptera
- c) Coleoptera
- d) Diptera

9. In helminthes, flame cells are component of their

- a) excretory system
- b) respiratory system
- c) reproductive system
- d) nervous system

10. The mode of feeding in leech is

- a) herbivorous
- b) carnivorous
- c) omnivorous
- d) sanguinivorous

Part II: Each question carries 2 marks. Write on separate papers provided at the end of question sheet.

11. Write short note on the any five of the following:

- | | | |
|-----------------------------|---------------|------------------|
| a. Cellular differentiation | b. Mast cells | c. Down syndrome |
| d. Dosage compensation | e. Porifera | f. Chordata |

Group-III: Microbiology

Part I: Underline the correct answer. Each question carries 1 mark. There will be no negative marking for wrong answers.

1. Bacterial conjugation was discovered by

- a) Beadle and Tatum
- b) Meselson and Stahl
- c) Lederberg and Tatum
- d) Griffith

2. The first confirmation regarding the status of DNA as genetic material was given by the work of Avery, Macleod and McCarty on

- a) *Escherichia coli*
- b) *Diplococcus pneumoniae*
- c) *Klebsiella pneumoniae*
- d) T2 phage

3. Which one of the following is dark repair mechanism?

- a) Nucleotide excision repair (NER)
- b) Base excision repair (BER)
- c) Both a & b
- d) None of the above

4. Which of the following is capable of oxidizing sulfur to sulfates?

- a) *Thiobacillus thiooxidans*
- b) *Desulfotomaculum thermoacetoxidans*
- c) *Rhodospirillum rubrum*
- d) *Rhodomicrobium vannielii*

5. Nitrogen fixation by the microorganisms can be detected by adopting the approach of

- a) demonstrating growth in a nitrogen free medium
- b) culturing the microorganisms in the presence of nitrogen labelled with isotopic nitrogen measuring $^{15}\text{N}_2$ by mass spectrometer
- c) cultivating the organisms in the nitrogen based medium for long period
- d) Both a & b

6. Which of the following groups of algae do not have eukaryotic organization?

- a) Blue green algae
- b) Green algae
- c) Golden brown algae
- d) Red algae

7. Type of restriction enzymes commonly used in recombinant DNA technology

- a) Type I
- b) Type II
- c) Type III
- d) Type IV

8. Teichoic acid is present in the cell wall of

- a) gram positive bacteria
- b) gram negative bacteria
- c) acid fast bacteria
- d) fungi

9. The mathematical equation represent for bacterial population by binary fission is

- a) $N=N_02^n$
- b) $\log (N/N_0)=0.3n$
- c) $\log (N/N_0)=n\log 2$
- d) All of the above

10. Scarlet fever is caused by

- a) *Listeria monocytogenes*
- b) *Streptococcus pyogenes*
- c) *Staphylococcus aureus*
- d) *Staphylococcus epidermidis*

Part II: Each question carries 2 marks. Write on separate papers provided at the end of question sheet.

11. Write short note on the any *five* of the following:

- | | | |
|--------------------|-----------------|---------------------|
| a. CFU | b. Nucleoid | c. Biofilms |
| d. Endemic disease | e. Disinfectant | f. Cytotoxic T cell |

Group-IV: Biochemistry

Part I: Underline the correct answer. Each question carries 1 mark. There will be no negative marking for wrong answers.

1. Which of the following biomolecule has self-repair mechanisms?

- a) DNA, RNA and protein
- b) DNA and RNA
- c) DNA and proteins
- d) DNA only

2. Cellulose is a linear polymer of

- a) D-glucose in β (1-4) linkages
- b) L-glucose in β (1-4) linkages
- c) D-glucose in α (1-6) linkages
- d) L-glucose in α (1-6) linkages

3. Topoisomerases causes

- a) DNA fragmentation
- b) supcoiling of DNA
- c) Both a & b
- d) None of the above

4. Ion channels are selective in nature because of its distinguishing power based on

- a) charge of the ions
- b) geometry of the ions
- c) Both a & b
- d) None of the above

5. If ΔG is negative in a biochemical reaction, it indicates

- a) favourable reaction
- b) unfavourable reaction
- c) is in equilibrium
- d) None of the above

6. Who won Nobel Prize in “Vitamin C”?

- a) Pearl Buck
- b) Arthur Kornberg
- c) Albert Szent-Györgyi
- d) Francis Crick

7. The proteins involved in mismatch repair are

- a) Mut S
- b) Mut H
- c) Mut L
- d) All of the above

8. The final common pathway of Metabolism is

- a) Cori's Cycle
- b) β -oxidation pathway
- c) TCA Cycle
- d) Kreb's Cycle

9. Acylglycerols or glycerides are mainly

- a) ester of fatty acids and glycerols
- b) ether of fatty acids and glycerols
- c) long chains of hydrocarbons only
- d) long chains of hydrophilic moiety

10. The universal hydrogen acceptor is

- a) NADP⁺
- b) ATP
- c) Co-A
- d) FMN

Part II: Each question carries 2 marks. Write on separate papers provided at the end of question sheet.

11. Write short note on the any five of the following:

- | | | |
|----------------------------------|-------------------|------------------------------|
| a. Non-covalent interaction | b. RNA polymearse | c. Sanger sequencing |
| d. Competitive Enzyme Inhibition | e. Glycolysis | f. Oxidative phosphorylation |

Group-V: Biotechnology

Part I: Underline the correct answer. Each question carries 1 mark. There will be no negative marking for wrong answers.

1. Who is the one awarded with Nobel Prize for contribution towards elucidation of 3D structure of DNA along with Watson and Crick?

- a) Rosalind Franklin
- b) Maurice Wilkins
- c) Linus Pauling
- d) Temin

2. The key enzyme that helped Kary Mullis in the invention of PCR was

- a) DNA polymerase I
- b) Taq DNA Polymerase
- c) Restriction endonuclease
- d) Vent polymerase

3. RNA required for the protein synthesis

- a) mRNA
- b) tRNA
- c) rRNA
- d) All of the above

4. The Bacterial Artificial Chromosome (BAC) should possess

- a) origin of replication (*ori*)
- b) partitioning element (*par*)
- c) selectable marker
- d) All of the above

5. Which one of the following techniques has been used for RNA hybridization?

- a) Southern blot
- b) Northern blot
- c) Western blot
- d) FISH

6. An unknown protein may be identified using

- a) its specific antibody
- b) its amino acid sequences
- c) its higher order structures
- d) None of the above

7. *AluI* is a 4-base cutter. The minimum length of DNA (in base-pair) required to cut twice by *AluI* will be

- a) 8
- b) 16
- c) 256
- d) 512

8. Synthetic seeds are produced by encapsulating somatic embryo with

- a) Sodium nitrate
- b) Sodium dodecyl sulphate
- c) Sodium alginate
- d) Sodium HEPES

9. Which of the following one is known as Super bug that can clean up oil spills?

- a) *Escherichia coli*
- b) *Bacillus subtilis*
- c) *Pseudomonas putida*
- d) *Lactobacillus acidophilus*

10. Which one of the following is not a co-dominant marker?

- a) RFLP
- b) RAPD
- c) SSR
- d) CAPS

Part II: Each question carries 2 marks. Write on separate papers provided at the end of question sheet.

11. Write short note on the any five of the following:

- | | | |
|-----------------|--------------------|---------------|
| a. Plasmid | b. Electroporation | c. Ti plasmid |
| d. Genetic code | e. Ligase | f. Telomere |

Name of the Candidate : _____

Registration No. : _____

