105

QUESTION PAPER SERIES CODE
A

Registration No. : | | | | | |

Centre of Exam. : _____

Name of Candidate : _____

_____
Signature of Invigilator

ENTRANCE EXAMINATION, 2018

M.Sc. in MOLECULAR MEDICINE

[Field of Study Code : CMMM (233)]

Time Allowed : 3 hours *Maximum Marks* : 70

INSTRUCTIONS FOR CANDIDATES

Candidates must read carefully the following instructions before attempting the Question Paper :

(i) Write your Name and Registration Number in the space provided for the purpose on the top of this Question Paper and in the Answer Sheet.

(ii) **Please darken the appropriate Circle of Question Paper Series Code on the Answer Sheet.**

(iii) The Question Paper is divided into two Parts : Part—A and Part—B. Both Parts have multiple-choice questions. All answers are to be entered in the Answer Sheet provided with the Question Paper for the purpose by darkening the correct choice, i.e., (a) or (b) or (c) or (d) with BALLPOINT PEN only against each question in the corresponding Circle.

(iv) Part—A consists of 30 questions and **all** are compulsory.

(v) Part—B consists of 60 questions. **Answer any 40 questions.**

In case any candidate answers more than the required 40 questions, the first 40 questions attempted will be evaluated.

(vi) Each correct answer carries *1* mark. **There will be no negative marking.**

(vii) Answer written by the candidate inside the Question Paper will not be evaluated.

(viii) Calculators and Log Tables may be used. Cell phones and other internet devices are strictly prohibited.

(ix) Pages at the end have been provided for Rough Work.

(x) Return the Question Paper and Answer Sheet/OMR to the Invigilator at the end of the Entrance Examination. **DO NOT FOLD THE ANSWER SHEET.**

INSTRUCTIONS FOR MARKING ANSWERS

1. Use only Blue/Black Ballpoint Pen (do not use pencil) to darken the appropriate Circle.
2. Please darken the whole Circle.
3. Darken ONLY ONE CIRCLE for each question as shown in example below :

Wrong	Wrong	Wrong	Wrong	Correct
● ⓑ ⓒ ●	Ø ⓑ ⓒ ⓓ	Ø ⓑ ⓒ Ø	◉ ⓑ ⓒ ●	ⓐ ⓑ ⓒ ●

4. Once marked, no change in the answer is allowed.
5. Please do not make any stray marks on the Answer Sheet.
6. Please do not do any rough work on the Answer Sheet.
7. Mark your answer only in the appropriate space against the number corresponding to the question.
8. **Ensure that you have darkened the appropriate Circle of Question Paper Series Code on the Answer Sheet.**

PART—A

Answer **all** questions

1. Which of the following wavelengths (λ) is used to measure the concentration of proteins lacking aromatic amino acids by spectrophotometer?

   (a) 254 nm

   (b) 214 nm

   (c) 280 nm

   (d) None of the above

2. The Nobel Prize for the year 2017 in 'Physiology or Medicine' was announced on Mahatma Gandhi's birthday. It was awarded for

   (a) discoveries of the mechanisms for autophagy

   (b) developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution

   (c) elucidation of the molecular mechanisms controlling circadian rhythms

   (d) G-protein coupled receptors

3. The pH is calculated as the

   (a) log of the hydroxyl ion (OH^-) concentration

   (b) negative log of the OH^- concentration

   (c) log of the hydrogen ion (H^+) concentration

   (d) negative log of the H^+ concentration

4. Which of the following sets represents molecules with linear geometry only?

   (a) SO_2, NO_2^-, H_2O, I_3^-

   (b) CO_2, NO_2^-, SO_2, IF_2^-

   (c) CO_2, NH_2^-, I_3^-, IF_2^-

   (d) CO_2, $BeCl_2$, I_3^-, IF_2^-

5. The brown ring test for nitrate depends on

(a) the reduction of ferrous sulphate to iron

(b) oxidation of nitric oxide to nitrogen dioxide

(c) the reduction of nitrate to nitric oxide

(d) oxidising action of sulphuric acid

6. The six most common atoms in organic molecules are

(a) C, H, O, He, Ca and S

(b) C, H, O, N, P and S

(c) C, H, O, Mg, Mn and S

(d) C, H, O, N, P and K

7. Which amino acid has an indole ring in its side chain?

(a) Phenylalanine

(b) Tyrosine

(c) Histidine

(d) Tryptophan

8. In a class of 5 students, the average age of the group is 10 years. When 2 new students join the group, the average age increases by 4 years. What is the average age of the two new students?

(a) 18

(b) 20

(c) 22

(d) 24

9. A person is standing at point *A*. He walks a distance of 10 km to the south, then turns right and walks for 5 km. Then he turns right and again walks for 10 km. How far is he from the point *A*?

(a) 3 km

(b) 5 km

(c) 10 km

(d) 15 km

10. The IUPAC name of $(CH_3)_2—CHCH_2—CH_2Br$ is

(a) 1-bromopentane

(b) 2-methyl-4-bromobutane

(c) 2-methyl-3-bromopentane

(d) 1-bromo-3-methylbutane

11. An organic compound on analysis produces C = 40%, H = 13·33% and N = 46·67%. The empirical formula of this compound is

(a) CH_5N

(b) CH_4N

(c) C_2H_5N

(d) C_2H_4N

12. Which of the following is an aromatic polymer of phenols?

(a) Pectin

(b) Chitin

(c) Lignin

(d) Cutin

13. A perfectly blackbody is one where

(a) absorptive power is infinity

(b) absorption point is 0

(c) emissive power is 1

(d) absorptive power is 1

14. The pitch of a note depends upon its

(a) wavelength

(b) amplitude

(c) frequency

(d) speed

15. If a freely falling body travels in the last second a distance equal to the distance travelled by it in the first three seconds, then the time of the travel is

(a) 7 sec

(b) 5 sec

(c) 3 sec

(d) 1 sec

16. A process in which temperature T of the system remains constant though other variables P and V may change, then it is called as

(a) isothermal process

(b) isochoric process

(c) isobaric process

(d) None of the above

17. What is the respective number of alpha and beta particles emitted in the following radioactive decay?

$$_{90}X^{200} \text{ to } _{80}X^{168}$$

(a) 8 alpha, 8 beta

(b) 8 alpha, 6 beta

(c) 6 alpha, 6 beta

(d) 6 alpha, 8 beta

18. Among the following the weakest is

(a) metallic bond

(b) ionic bond

(c) van der Waals' bond

(d) covalent bond

19. In cystic fibrosis, a specific channel named cystic fibrosis transmembrane regulator (CFTR) becomes non-functional. This channel is responsible for transporting

(a) chloride ions

(b) H^+ ions

(c) sulphate ions

(d) sodium ions

20. The reaction of fat and sodium hydroxide is known as

(a) dehydration

(b) hydrogenation

(c) saponification

(d) esterification

21. Solution of a hygroscopic compound having desired strength is prepared by

(a) weighing out desired amount of compound and dissolving in appropriate volume of H_2O

(b) weighing out desired amount of compound and dissolving in appropriate volume of organic solvent

(c) dissolving the entire content of the packaged compound in appropriate volume of H_2O

(d) dissolving the entire content of the packaged compound in appropriate volume of butanol

22. Which of the following chemicals is used to denature DNA during plasmid purification?

(a) Sodium dodecyl sulfate (SDS)

(b) Potassium acetate

(c) Sodium hydroxide (NaOH)

(d) Phenol

23. Oral rehydration therapy is based on

(a) glucose transporter

(b) sodium transporter

(c) sodium and glucose symporters

(d) glucose and potassium antiporters

24. The separation of DNA fragments generated by restriction endonucleases in a chemical reaction can be most conveniently performed by

(a) real-time PCR

(b) microcentrifugation

(c) electrophoresis

(d) Ouchterlony double diffusion

25. Which of the following microscopes is best suited in the study of internal cellular structures?

(a) Light microscope

(b) Compound microscope

(c) Scanning electron microscope

(d) Transmission electron microscope

26. Not many persons have been awarded two Nobel Prizes. There are only four of them with this honour : John Bardeen, Frederick Sanger, Marie Curie and Linus Pauling. Two of them obtained prizes in different subjects. The most well-known of them is Marie Curie, who was awarded Nobel Prizes in both Physics and Chemistry. The other is Linus Pauling. Which two separate Nobel Prizes was he awarded?

(a) Chemistry and Physics

(b) Physics and Physiology or Medicine

(c) Chemistry and Physiology or Medicine

(d) Chemistry and Peace

27. Which of the following is Phase II metabolism reaction?

(a) Acetylation

(b) Reduction

(c) Hydrolysis

(d) Oxidation

28. What is the ratio of DNA : protein in chromatin?

(a) 1 : 1

(b) 2 : 1

(c) 3 : 1

(d) 4 : 1

29. Which of the following is ***not*** a derivative of cholesterol?

(a) Vitamin D

(b) Vitamin E

(c) Bile salts

(d) Steroid hormones

30. The term 'mitochondria' was given by

(a) Carl Benda

(b) Richard Altmann

(c) George Palade

(d) Christian de Duve

PART—B

Answer *any* **forty** questions

31. Which of the following is a cyanophage?

(a) LPP-1

(b) SV 40

(c) Hepatitis C

(d) Tobacco mosaic virus

32. Induced fit theory of enzyme action was proposed by

(a) Fischer

(b) Ramachandran

(c) Koshland

(d) Mitchell

33. Cyathium is a type of

(a) alga

(b) fungus

(c) virus

(d) inflorescence

34. A good example of an auxin herbicide is

(a) 1-naphthalene acetic acid (NAA)

(b) indole-3-butyric acid (IBA)

(c) indole-3-acetic acid (IAA)

(d) 2, 4-dichlorophenoxyacetic acid (2, 4-D)

35. In prokaryotes, the genetic material is

(a) linear DNA without histones

(b) circular DNA without histones

(c) linear DNA with histones

(d) circular DNA with histones

36. Mendel's dihybrid cross ratio is

(a) 9 : 3 : 3 : 1

(b) 1 : 2 : 1

(c) 12 : 6 : 3 : 1

(d) 1 : 2 : 3 : 4

37. The pairing of homologous chromosomes during meiosis is called as

(a) crossing over

(b) tetrad

(c) synapsis

(d) terminalisation

38. 'Ecological niche' of a species means

(a) specific number of populations

(b) specific function of a species

(c) habitat and specific function of a species

(d) specific place where the organism lives

39. Earthworm cannot undergo self-fertilization because of

(a) protogyny

(b) protandry

(c) unisexuality

(d) None of the above

40. Which one of the following is made up of a single bone in mammals?

(a) Dentary

(b) Hyoid

(c) Zygomatic arch

(d) Upper jaw

41. Cerebellum of brain is concerned with

(a) the contraction of voluntary muscles

(b) coordinating and regulating tones

(c) maintaining posture, orientation and equilibrium of the body

(d) All of the above

42. Which of the following carries glucose from digestive tract to liver?

(a) Pulmonary artery

(b) Hepatic portal vein

(c) Renal portal system

(d) Pulmonary vein

43. Pellagra is caused by the deficiency of

(a) riboflavin

(b) niacin

(c) cyanocobalamine

(d) folic acid

44. Marriage between man with normal vision and colour-blind woman will produce

(a) all normal visioned children

(b) 50% colour-blind daughter and son

(c) colour-blind daughter and normal son

(d) colour-blind son and carrier daughter

45. The vagus nerve is the cranial nerve numbering

(a) 5th

(b) 6th

(c) 9th

(d) 10th

46. The final hormonal stimulus leading to ovulation in human is provided by

(a) estrogen

(b) LH

(c) TSH

(d) FSH

47. Find the order of the reaction, if the rate of a gaseous reaction is halved when the volume of the vessel is doubled.

(a) 1

(b) 2

(c) 0

(d) 3

48. Silkworm silk is produced by

(a) salivary gland of adult

(b) salivary gland of larvae

(c) salivary gland of pupa

(d) derivative of egg cells

49. Gaseous mixture used by Stanley Miller for amino acids through heat and electric discharge includes

(a) methane, nitrogen, hydrogen and water vapour

(b) methane, hydrogen, oxygen and water vapour

(c) methane, ammonia, nitrogen, and water vapour

(d) methane, ammonia, hydrogen and water vapour

50. Phytochrome becomes active in

(a) green light

(b) red light

(c) blue light

(d) white light

51. The changes in environmental temperature affect most of the animals those are

(a) homeothermic

(b) isothermic

(c) poikilothermic

(d) endothermic

52. A patient of diabetes mellitus excretes glucose in urine even when the patient is kept on a carbohydrate-free diet because

(a) amino acids are catabolized in liver

(b) fats are catabolized to form glucose

(c) amino acids are discharged in blood stream from liver

(d) glycogens from muscles are released in the blood stream

53. Diphtheria is characterized by

(a) gum bleeding

(b) dehydration

(c) hydrophobia

(d) suffocation

54. Which of the following is both exocrine and endocrine glands?

(a) Pancreas

(b) Liver

(c) Pituitary

(d) Thyroid

55. Sexual mode of reproduction in protozoa is known as

(a) plasmogamy

(b) plasmotomy

(c) anisogamy

(d) schizogony

56. Nitrates are converted to nitrogen by

(a) nitrogen-fixing bacteria

(b) denitrifying bacteria

(c) nitrifying bacteria

(d) All of the above

57. A woman of 48 years of age is having the symptoms of weight gain, cold intolerance, constipation, bradycardia, puffy face, lethargy and dry skin. These symptoms are suggestive of which of the following?

(a) Overuse of corticosteroid

(b) Hypothyroidism

(c) Estrogen deficiency

(d) Overuse of thyroxin sodium

58. Which tissue has the greatest capacity of biotransformation of drugs in the body?

(a) Brain

(b) Kidney

(c) Liver

(d) Lung

59. Which one of the following mediates its pharmacological action through the nuclear receptors?

(a) Steroid hormones

(b) Paracetamol

(c) Dopamine

(d) Insulin

60. Increased risk of atherosclerosis is associated with decreased serum levels of

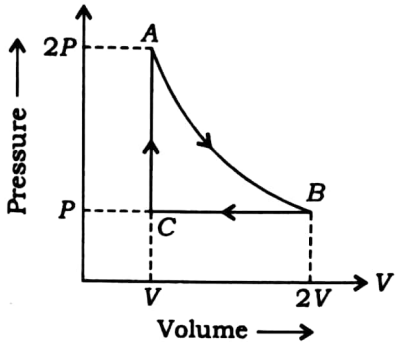
(a) LDL

(b) HDL

(c) triglycerides

(d) VLDL

61. The figure below shows the P–V diagram for a fixed mass of an ideal gas undergoing cyclic process $ABCA$. If the temperature at A is T, what is the temperature at C?



(a) $4T$

(b) $2T$

(c) T

(d) $T/2$

62. In a cross between heterozygous tall (Tt) and homozygous tall (TT), there are 12 progenies. How many are tall?

(a) 6

(b) 8

(c) 10

(d) 12

63. Which one of the following is ***not*** true?

(a) Eukaryotic mRNA precursors are processed in the cytoplasm.

(b) The mRNA precursors are processed by 5′ capping.

(c) Nascent pre-mRNA transcripts are associated with a RNA binding protein.

(d) Processed RNAs are translated by ribosomes.

64. Which one of the following is ***not*** a type of neurological cells?

(a) Oligodendrocyte

(b) Chondrocyte

(c) Microglia

(d) Astrocyte

65. Disulphide bonds in proteins are usually broken by

(a) triton X-100

(b) β-mercaptoethanol

(c) SDS

(d) boiling

66. If the pH of the buffer is below than the pI of the protein, the net charge of the protein will be

(a) positive

(b) negative

(c) neutral

(d) uncharged

67. On boiling an egg, the egg's white ovalbumin hardens. Which of the following structures in ovalbumin is least affected?

(a) Primary structure

(b) Secondary structure

(c) Tertiary structure

(d) Quaternary structure

68. Extrachromosomal DNA is present in which of the following organelles?

(a) Ribosomes

(b) Chloroplast

(c) Endoplasmic reticulum

(d) Nucleus

69. The fruiting body in *Aspergillus* is also known as

(a) apothecium

(b) perithecium

(c) cleistothecium

(d) hypanthodium

70. The class of fungi producing 8 spores in a sac-like structure is called

(a) phycomycetes

(b) ascomycetes

(c) basidiomycetes

(d) deuteromycetes

71. The type of restriction enzymes used in recombinant DNA technology is

(a) type I

(b) type II

(c) type III

(d) All of the above

72. Transformation using tungsten or gold particle-coated DNA accelerated at high-voltage is called as

(a) accelerated DNA delivery module

(b) DNA sprinting

(c) DNA blasting

(d) particle gun delivery

73. In hybridoma technology, aminopterin is used because it

(a) blocks the salvage pathway

(b) prevents the growth of B cells

(c) prevents the growth of myeloma cells

(d) blocks the synthesis of Ig by B cells

74. Which of the following techniques is used for the separation of large DNA fragments?

(a) SDS-PAGE

(b) SAGE

(c) PFGE

(d) Native PAGE

75. Labelled antibodies are used in the following diagnostic methods, except

(a) enzyme-linked immunosorbent assay

(b) immunofluorescence assay

(c) radioimmunoassay

(d) haemagglutinin assay

76. *Bacillus thuringiensis* is commonly used as

(a) fungicide

(b) rodenticide

(c) insecticide

(d) microbicidal agent

77. Different possible catabolic fates of pyruvate formed in glycolysis are

(a) ethanol, acetyl CoA and lactic acid

(b) methanol, acetyl CoA and lactic acid

(c) CO_2, acetyl CoA and succinate

(d) fumarate, acetyl CoA and lactic acid

78. In citric acid cycle, carbon atom enters the cycle as acetyl CoA. Carbon atom is released as

(a) CoA-SH

(b) CO_2

(c) NADH

(d) $FADH_2$

79. The length of piRNAs is

(a) more than 26 nucleotides

(b) between 21 to 26 nucleotides

(c) less than 21 nucleotides

(d) None of the above

80. Which of the following diseases could be treated with antibiotic?

(a) Malaria

(b) Mad cow disease

(c) Bird flu

(d) Gastric ulcer

81. The retention of water in the kidney is regulated by

(a) insulin

(b) diuretic hormone

(c) antidiuretic hormone

(d) glucagon

82. The proteins can be separated on the basis of

(a) size or mass

(b) net charge

(c) solubility in the ammonium sulphate solution

(d) All of the above

83. Cori cycle is very important in metabolism as it transports lactic acid

(a) from muscle to liver

(b) from liver to muscle

(c) Both ways

(d) in adipose tissues only

84. Reduced glutathione (GSH) maintains the normal reduced state of the cell. It is a

(a) dipeptide

(b) tripeptide

(c) tetrapeptide

(d) small molecule inhibitor

85. The archeal membranes are more resistant to hydrolysis due to the presence of

(a) ether bond

(b) ester bond

(c) glycosidic bond

(d) peptide bond

86. Mobilization of stored triacylglycerol from the adipocytes takes place in the presence of which of the following hormones?

(a) Epinephrine

(b) Norepinephrine

(c) Insulin

(d) Lipase

87. How many molecules of acetyl CoA will be formed from the beta oxidation (beta carbon with respect to the carboxylic group) of Palmitic acid (C_{16})?

(a) 7

(b) 8

(c) 9

(d) 10

88. Malfunction in lymph nodes will result into

(a) deposition of uric acid

(b) abnormal glucose metabolism

(c) abnormal blood flow

(d) increase in infections

89. The receptors which are recognized by the immune systems are

(a) MHC

(b) TCR

(c) BCR

(d) All of the above

90. Low cytokinin to auxin ratio in tissue culture causes

(a) root differentiation

(b) shoot differentiation

(c) None of the above

(d) Both (a) and (b)