Roll No. .....

Question Booklet Number

O. M. R. Serial No. | | | | | | | | |

M. Sc. (Biotechnology) (Second Semester)

EXAMINATION, July, 2022

PHYSIOLOGY & METABOLISM

Paper Code				
MBT	2	0	0	3

Questions Booklet Series
C

Time : 1:30 Hours] [*Maximum Marks : 100*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) (शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. Each cycle of β-oxidation produces :

(A) 1 FAD, 1 NADH and 1 acetyl-CoA

(B) 1 $FADH_2$, 1 NADH and 1 acetyl-CoA

(C) 1 FAD, 1 NAD^+, and $2\,CO_2$ molecules.

(D) 1 $FADH_2$, 1 NADH and $2\,CO_2$ molecules.

2. Oxidation of palmitic acid (C16) involves _____ rounds of B-oxidation and yields _____ molecules of acetyl-CoA.

(A) 8, 8

(B) 7, 8

(C) 16, 8

(D) 7, 7

3. Which of the following would yield the most energy per gram when oxidized ?

(A) Starch

(B) Glycogen

(C) Fat

(D) Protein

4. The acyl-CoA formed in the cytosol is transported to the–for oxidation using a shuttle involving the intermediate formation of acyl _____.

(A) mitochondrial matrix, carnitine

(B) mitochondrial matrix, coenzyme A

(C) endoplasmic reticulum, albumin

(D) endoplasmic reticulum, carnitine

5. The major difference between the anabolism and catabolism of fatty acids is that :

(A) Acetyl-CoA is not required for anabolism.

(B) Anabolism occurs in the intermembrane space of mitochondria while catabolism takes place in the mitochondrial matrix.

(C) Biotin is required for oxidation of fatty acids but not for anabolism.

(D) NADPH is required for anabolism of fatty acids and not for catabolism.

6. Ketone bodies are formed when :

(A) An organism consumes excessive amounts of carbohydrate.

(B) Oxaloacetate is converted to acetyl-CoA.

(C) There is a deficiency of acetyl-CoA.

(D) There is not enough oxaloacetate to react with available acetyl-CoA.

7. Most of the reducing equivalents (NADPH) utilized for the synthesis of fatty acids can be generated from :

(A) Glycolysis

(B) Mitochondrial malate dehydrogenase

(C) The citric acid cycle

(D) The pentose-phosphate pathway

8. During each cycle of ongoing fatty acid oxidation, all the following compounds are generated, except :

(A) Acetyl-CoA

(B) Fatty acyl-CoA

(C) NADH

(D) Water

9. High content of triglyceride is seen in :

(A) HDL

(B) LDL

(C) VLDL

(D) Chylomicrons

10. Bile acid is synthesized in _____ .

(A) Kidney

(B) Liver

(C) Pancreas

(D) Stomach

11. Which out of the following amino acids is not converted to Succinyl co A ?

(A) Methionine

(B) Valine

(C) Isoleucine

(D) Histidine

12. All of the following compounds are synthesized by transmethylation reactions, except :

(A) Choline

(B) Epinephrine

(C) Creatine

(D) Ethanolamine

13. The diet of a child suffering from Maple syrup urine disease (an amino acid disorder), should be low, in which out of the following amino acids content ?

(A) Branched chain amino acids

(B) Phenylalanine alanine

(C) Methionine

(D) Tryptophan

14. Urea is synthesized in :

(A) Cytoplasm

(B) Mitochondria

(C) Both cytoplasm and mitochondria

(D) Lysosomes

15. All of the following amino acids are donors of one carbon compounds, except :

(A) Histidine

(B) Tyrosine

(C) Tryptophan

(D) Serine

16. The two nitrogen of urea are derived from :

(A) Aspartate and ammonia

(B) Glutamate and ammonia

(C) Argino succinate and ammonia

(D) Alanine and ammonia

17. Which coenzyme out of the following is required for the oxidative deamination of most of amino acids ?

(A) Folic acid

(B) Pyridoxal-P

(C) FMN

(D) FAD

18. Choose the incorrect statement about amino acid glycine :

(A) One carbon donor

(B) Required for the synthesis of haem

(C) Forms oxalates upon catabolism

(D) Both glucogenic as well as ketogenic

19. Which out of the following is required as a coenzyme for the transamination reactions ?

(A) Coenzyme-A

(B) Pyridoxal-P

(C) Folic acid

(D) Cobalamine

20. In which form the nitrogen is incorporated into an amino acid ?

(A) Nitrite

(B) Glutamate

(C) Nitrate

(D) Ammonium ion

21. An amino group donated by glutamine is attached at C-1 of PRPP, this results in _____.

(A) 5-phosphoribosylamine

(B) 4-phosphoribosylamine

(C) 3-phosphoribosylamine

(D) 2-phosphoribosylamine

22. The first intermediate with a complete purine ring is _____.

(A) Inosinate

(B) Formate

(C) Aspartate

(D) Glycine

23. Which of the following is an important precursor in the purine pathway ?

(A) Glycine

(B) Aspartate

(C) Glutamine

(D) Leucine

24. In the first committed step of pyrimidine biosynthesis, the reaction is catalyzed by _____.

(A) Adenylate kinase

(B) Aspartate transcarbamoylase

(C) Dihyhroorotase

(D) Cytidylate synthase

25. Phosphorylation of AMP to ADP is promoted by _____.

(A) Adenylate kinase

(B) Aspartate transcarbamoylase

(C) Dihyhroorotase

(D) Cytidylate synthase

26. CTP is formed from UTP by the action of _____.

(A) Adenylate kinase

(B) Aspartate transcarbamoylase

(C) Dihyhroorotase

(D) Cytidylate synthase

27. Conversion of dUMP to dTMP is catalyzed by _____.

(A) Thymidylate synthase

(B) Dihydrofolate reductase

(C) Dihyhroorotase

(D) Cytidylate synthase

28. Adenosine deaminase deaminates adenosine to _____.

(A) Hypoxanthine

(B) Inosine

(C) Xanthine

(D) Guanosine

29. Which of the following is degraded to methylmalonyl semialdehyde ?

(A) Glutamine

(B) Tyrosine

(C) Thymine

(D) Leucine

30. Which of the following is an important precursor in pyrimidine pathway ?

(A) Glycine

(B) Aspartate

(C) Glutamine

(D) Leucine

31. Which of the following equations shows the relationship between free energy change (ΔG) and the change in entropy (ΔS), under constant temperature and pressure ?

(A) $\Delta G = T\Delta H - \Delta S$

(B) $\Delta G = T\Delta H/\Delta S$

(C) $\Delta G = \Delta H/T\Delta S$

(D) $\Delta G = \Delta H - T\Delta S$

32. What is the site for gluconeogenesis ?

(A) Liver

(B) Blood

(C) Muscles

(D) Brain

33. Law of thermodynamics which states that energy can neither be created nor be destroyed is _____.

(A) The second law of thermodynamics

(B) Third law of thermodynamics

(C) First law of thermodynamics

(D) Zero-order kinetics

34. Gibbs' free energy is the portion of the total energy which is available for useful work.

(A) True

(B) False

35. Name the enzyme which is responsible for the conversion of pyruvate to phosphoenolpyruvate (PEP) ?

(A) Pyruvate carboxylase

(B) Pyruvate carboxykinase

(C) Glucose-6-phosphatase

(D) Phosphofructokinase

36. Which of the following are major sites for glycogen storage ?

(A) Adipose tissue

(B) Bones

(C) Muscle and liver

(D) Kidney and liver

37. What is the value of ΔG, when a system is in equilibrium ?

(A) $\Delta G = 0$

(B) $\Delta G = 1$

(C) $\Delta G = -1$

(D) $\Delta G = \Delta G^0$

38. Which of the following act as a storage form of high energy phosphate ?

(A) Glucose-6-phosphate

(B) Phosphoenolpyruvate

(C) Phosphazens

(D) Glycerol phosphate

39. Which of the following is the precursor of glycogen ?

(A) Glycerol-3-phosphate

(B) Malate

(C) UDP-glucose

(D) Leucine and lysine

40. What is the name of the molecule which donates its electrons ?

(A) Reducing agent

(B) Oxidative agent

(C) Standard reduction potential

(D) Oxidant

41. Which of the following hormones maintain blood glucose level by activation of gluconeogenesis ?

(A) Norepinephrine

(B) Glucagon

(C) Insulin

(D) Epinephrine

42. Name the enzyme which is used for branching of glycogen :

(A) Branching enzyme

(B) Hexokinase

(C) Phosphoglucomutase

(D) Glycogen synthase

43. What is the final product of electron transport chain ?

(A) AMP

(B) H_2O

(C) ATP

(D) ADP

44. Glycolysis is also known as _____.

(A) Citric acid cycle

(B) Tricarboxylic acid cycle

(C) Kreb's cycle

(D) Embden-Meyerhof pathway

45. Citric acid cycle essentially involves the oxidation of acetyl-CoA to CO_2 and _____.

(A) H_2O

(B) O_2

(C) H_2O_2

(D) S_2

46. The final product of the catabolism of the eaten potato in the human body is mainly_____.

(A) starch

(B) maltose

(C) glucose

(D) carbon dioxide and water

47. The concentration of $C_6H_{12}O_6$ in normal blood is stable at 80-120 mg/dL and the source of blood sugar does not include _____.

(A) Absorbed after digesting food

(B) Hepatic glycogenolysis

(C) Conversion of non-sugar substances

(D) Muscle glycogenolysis

48. Which of the following enzymes are not involved in glycolysis metabolism ?

(A) Hexokinase

(B) Pyruvate kinase

(C) Citrate synthase

(D) None of the above

49. Pyruvate, the end product of glycolysis, enters the citric acid cycle after it has been converted to :

(A) Acetaldehyde

(B) Lactic acid

(C) Acetic acid

(D) Acetyl-CoA

50. Most of the ATP made during cellular respiration is generated by :

(A) substrate-level phosphorylation

(B) oxidative phosphorylation

(C) glycolysis

(D) photophosphorylation

51. Oxidative decarboxylations :

(A) do not occur in the TCA cycle

(B) involve loss of CO_2 and the production of NAD

(C) involve loss of CO_2 and the production of NADH

(D) involve loss of CO_2 and the production of $FADH_2$

52. Which metabolic pathway or process is common to both aerobic and anaerobic oxidation of sugar ?

(A) Kreb's cycle

(B) Chemiosmosis in mitochondrion

(C) Glycolysis

(D) Oxidation of NAD^+ by the electron transport chain

53. The $FADH_2$ and NADH produced by the oxidation of one acetyl-CoA result in the synthesis of about _____ ATPs.

(A) 4

(B) 7

(C) 11

(D) 15

54. During electron transport, protons are pumped out of the mitochondrion at each of the major sites except for :

(A) Complex I

(B) Complex II

(C) Complex III

(D) Complex IV

55. The cytochrome c oxidase complex :

(A) accepts electrons from cyt-c.

(B) donates four electrons to O_2.

(C) produces $2\,H_2O$ per O_2 reduced

(D) All of the above are correct.

56. Which of the following steps is common in the glycolysis and pentose-phosphate pathway ?

(A) Conversion of glucose to glucose-6-P

(B) Conversion of glucose-6-p to ribose-5-P

(C) Conversion of glucose-6-Pto fructose-6-P

(D) Conversion of glucose to glucose-1-P

57. Pentose-phosphate pathway is responsible for generating NADPH (reducing equivalents in the cell) in the cell. Which of the following enzyme is involved in generating NADPH ?

(A) Glucose-6-P oxidase

(B) Glucose-6-P dehydrogenase

(C) Glucose-6-P reductase

(D) Glucose-6-P synthetase

58. Glucose-6-Phosphate dehydrogenase is allosterically inhibited by _____.

(A) Acetyl-CoA

(B) Citrate

(C) Glucose

(D) Fructose

59. Bile acid is derived from :

(A) Cholesterol

(B) Amino acids

(C) Fatty acids

(D) Bilirubin

60. Which of the following inhibits acetyl-CoA carboxylase-a rate-limiting enzyme of fatty metabolism ?

(A) Citrate

(B) ATP

(C) Malonyl-CoA

(D) Acyl-CoA

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is ny discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर— A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।