

Set No. : 1

Question Booklet No.

RET/16/TEST-B

887

Biochemistry (Science)

(To be filled up by the candidate by blue/black ball point pen)

Roll No.

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Roll No. (Write the digits in words)

Serial No. of OMR Answer Sheet

Day and Date

(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only blue/black ball-point pen in the space above and on both sides of the Answer Sheet)

1. Within 30 minutes of the issue of the Question Booklet, Please ensure that you have got the correct booklet and it contains all the pages in correct sequence and no page/question is missing. In case of faulty Question Booklet, Bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope.*
3. *A separate Answer Sheet is given. It should not be folded or mutilated. A second Answer Sheet shall not be provided.*
4. Write your Roll Number and Serial Number of the Answer Sheet by pen in the space provided above.
5. *On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.*
6. *No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and Roll No. and OMR sheet no. on the Question Booklet.*
7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.*
8. *This Booklet contains 40 multiple choice questions followed by 10 short answer questions. For each MCQ, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet. For answering any five short Answer Questions use five Blank pages attached at the end of this Question Booklet.*
9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*
11. For rough work, use the inner back pages of the title cover and the blank page at the end of this Booklet.
12. *Deposit both OMR Answer Sheet and Question Booklet at the end of the Test.*
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

Total No. of Printed Pages : 20

8.

RET/16/TEST-B

887/Biochemistry (Science)

ROUGH WORK

रफ़ कार्य

Research Entrance Test-2016

No. of Questions : 50

प्रश्नों की संख्या : 50

Time : 2 Hours

Full Marks : 200

समय : 2 घण्टे

पूर्णाङ्क : 200

Note: (1) This Question Booklet contains **40** Multiple Choice Questions followed by **10** Short Answer Questions.

इस प्रश्न पुस्तिका में **40** वस्तुनिष्ठ व **10** लघु उत्तरीय प्रश्न हैं।

(2) Attempt as many MCQs as you can. Each MCQ carries **3 (Three)** marks. **1 (One)** mark will be deducted for each incorrect answer. **Zero** mark will be awarded for each unattempted question. If more than one alternative answers of MCQs seem to be approximate to the correct answer, choose the closest one.

अधिकाधिक वस्तुनिष्ठ प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक वस्तुनिष्ठ प्रश्न **3 (तीन)** अंकों का है। प्रत्येक गलत उत्तर के लिए **1 (एक)** अंक काटा जायेगा। प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक शून्य होगा। यदि वस्तुनिष्ठ प्रश्नों के एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

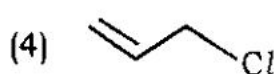
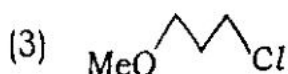
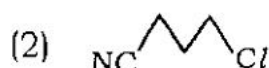
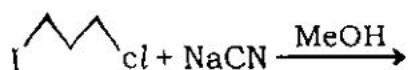
(3) Answer only **5** Short Answer Questions. Each question carries **16 (Sixteen)** marks and should be answered in **150-200** words. Blank **5 (Five)** pages attached with this booklet shall only be used for the purpose. Answer each question on separate page, after writing Question No.

केवल **5 (पाँच)** लघुउत्तरीय प्रश्नों के उत्तर दें। प्रत्येक प्रश्न **16 (सोलह)** अंकों का है तथा उनका उत्तर **150-200** शब्दों के बीच होना चाहिए। इसके लिए इस पुस्तिका में लगे हुए सादे **5 (पाँच)** पृष्ठों का ही उपयोग आवश्यक है। प्रत्येक प्रश्न का उत्तर एक नए पृष्ठ से, प्रश्न संख्या लिखकर शुरू करें।

1. Which is not true for reactions by the S_N2 mechanism ?

- (1) proceeds through a backside attack and results in inversion
- (2) tends to proceed with weak nucleophiles solvents like CH_3OH , H_2O , CH_3CH_2OH .
- (3) rate of reaction proceeds from primary (fastest) > secondary >> tertiary (slowest)
- (4) occurs in one step

2. Which is the main product of the following reaction ?



3. Which of the following conditions is necessary for a reaction to be spontaneous ?

(1) $\Delta S_{sur} > 0$

(2) $\Delta S_{sys} > 0$

(3) $\Delta S_{sur} + \Delta S_{sys} > 0$

(4) $\Delta S_{sur} + \Delta S_{sys} < 0$

4. Dead organs are generally stored in formalin. Formalin is :

(1) aqueous formaldehyde

(2) aqueous ferrous sulphate

(3) aqueous formic acid

(4) aqueous ferric alum

5. Regarding "carbon credits", which one of the following statement is **not** correct :
- (1) The carbon credit system was ratified in conjunction with the Kyoto Protocol.
 - (2) Carbon credits are awarded to countries or groups that have reduced greenhouse gases below their emission quota.
 - (3) The goal of the carbon credit system is to limit the increase of carbon dioxide emission.
 - (4) Carbon credits are traded at a price fixed from time to time by the United Nations Environment Programme.
6. Ball bearings are used in bicycles, cars, etc., because :
- (1) the actual area of contact between the wheel and axle is increased.
 - (2) the effective area of contact between the wheel and axle is increased
 - (3) the effective area of contact between the wheel and axle is reduced
 - (4) the actual area of contact between the wheel and axle is reduced.
7. During respiration, energy is released. It is stored in the form of :
- (1) ADP (2) ATP (3) NADP (4) APP
8. Which of the following is known as Royal disease :
- | | |
|------------------------|----------------------|
| (1) Sickle cell anemia | (2) Haemophilia |
| (3) Alzheimers disease | (4) Colour blindness |
9. The xylem in plants is responsible for :
- | | |
|-------------------------|------------------------------|
| (1) transport of water | (2) transport of food |
| (3) transport of oxygen | (4) transport of amino acids |

10. Two wires, of the same material, have their lengths in the ratio 1:2 and their diameters in the ratio 2:1. If both are stretched separately by equal weights, the ratio of increase in their lengths, $L_1 : L_2$ would be :
- (1) 1:2 (2) 2:1 (3) 1:8 (4) 8:1
11. Inborn errors of metabolism are usually inherited in what fashion ?
- (1) Autosomal recessive (2) x - linked recessive
(3) Mitochondrial inheritance (4) Y- linked recessive
12. Tay Sach's disease is caused by :
- (1) Hexosaminidase A overproduction
(2) Sphingomyelinase deficiency
(3) Hexosaminidase A deficiency
(4) Glucocerebrosidase deficiency
13. The brain area affected in Parkinson's disease is :
- (1) pars compacta of the substantia nigra
(2) pars reticulata of the substantia nigra
(3) locus ceruleus raphe nuclei
(4) Nucleus accumbens
14. Acquired hemophilia can occur due to :
- (1) Iron deficiency
(2) Development of autoantibodies
(3) Trauma
(4) Post childbirth
15. What is the precursor of dopamine ?
- (1) Tryptophan (2) Tyrosine
(3) Acetylcholine (4) Norepinephrine
16. Purpura is characterized by :
- (1) Ataxia (2) Loss of melanin
(3) Purple spots on skin (4) purple color spots in eye

17. Over 50% of common cancers are associated with damage to a protein, p53. This protein :
- (1) is a cyclin
 - (2) is a tumor suppressor
 - (3) is an oncogene
 - (4) regulates apoptosis
18. The three identical β subunits of the F₁, complex during ATP synthesis have :
- (1) different affinities for ATP but not for ADP
 - (2) different affinities for ADP but not for ATP
 - (3) different affinities for both ATP and ADP
 - (4) similar affinities for ADP and ATP
19. The unfavorable free energy associated with not satisfying a hydrogen bond after formation of the double helix is approximately :
- (1) 10 kJ/mol
 - (2) 20 kJ/mol
 - (3) 25 kJ/mol
 - (4) 30 kJ/mol
20. The sequence of letters 'TYDN' will represent :
- (1) Threonine, tyrosine, glutamic acid, asparagine
 - (2) Threonine, tyrosine, aspartic acid, asparagine
 - (3) Threonine, glutamine, tryptophan, asparagine
 - (4) Glutamine, tyrosine, tryptophan, aspartic acid
21. RNA is susceptible to alkaline hydrolysis, but not DNA because :
- (1) RNA is single and nitrogenous bases are exposed to alkali
 - (2) RNA can form intra base-pairing but not DNA
 - (3) RNA has 2'-OH group
 - (4) RNA is smaller than DNA

- 22.** Which one of the following techniques is used for studying genome wide differential gene expression ?
- (1) Western blotting (2) DNA microarray
(3) Northern blotting (4) Pyro-sequencing of genomes
- 23.** The resting potential of a neuron is dependent on what two ions ?
- (1) Lead and calcium ions
(2) Calcium and phosphate ions
(3) Sodium and potassium ions
(4) Potassium and phosphate ions
- 24.** Alpha helix of a protein can be estimated at the following wavelength in CD spectrum :
- (1) 217 nm (2) 222 nm
(3) 190 nm (4) 280 nm
- 25.** Virulancy of Ti plasmid is due to :
- (1) Nopaline (2) Dopamine
(3) Arginine (4) Ornithine
- 26.** How can RUBISCO be modified to increase its carboxylase activity and reduce its oxygenase activity :
- (1) Asn at 128 position is replaced by Gln
(2) Asp at 198 position is replaced by Glu
(3) Asp at 198 position is replaced by Gln
(4) Asn at 198 position is replaced by Gln
- 27.** Aromatic amino acids can be detected by :
- (1) Sakaguchi reaction (2) Millon-Nasse reaction
(3) Hopkins-Cole reaction (4) Xanthoproteic reaction
- 28.** Which one of the following immunoglobulins can readily cross placenta ?
- (1) IgM (2) IgG (3) IgA (4) IgE

29. Sickle cell anemia provides genetic resistance towards one of the following diseases :

- | | |
|------------------|------------------------------|
| (1) Tuberculosis | (2) Diabates |
| (3) Malaria | (4) Coronary artery diseases |

30. Enzymes whose concentration in a cell is independent of any inducer is called as :

- | | |
|-------------------------|----------------------|
| (1) Ribozyme | (2) Abzyme |
| (3) Constitutive enzyme | (4) Inductive enzyme |

31. Diabetes mellitus is characterized by :

- (1) Increased tolerance to carbohydrates
- (2) Decreased tolerance to carbohydrates
- (3) Increased secretion of insulin
- (4) Decreased blood glucose level

32. mt DNA is :

- (1) Single, Double stranded linear DNA molecule
- (2) Single, Double stranded circular DNA molecule
- (3) Single, single stranded circular DNA molecule
- (4) Single, single stranded linear DNA molecule

33. Which of the following is substrate for purine biosyntheses ?

- (1) PRPP (5 - phosphoribosyl pyrophosphate)
- (2) Ribose phosphate
- (3) Ara-C
- (4) 5 - methyl thymidine

34. All of the following enzyme are involved in DNA replication except.

- | | |
|--------------------|--------------|
| (1) DNA polymerase | (2) Helicase |
| (3) RNA polymerase | (4) Primase |

35. Genetic variation can be introduced into the bacteria by the following methods except :
- (1) Transduction
 - (2) DNA amplification
 - (3) Transformation
 - (4) Mutation
36. The DNA chain acting as template for RNA synthesis has AGCTTCGAT order of bases. What will be the order of bases in mRNA ?
- (1) TCGAAGCTA
 - (2) UGCUAGCTA
 - (3) TCGAUCGUA
 - (4) UCGAAGCUA
37. The complementarity determining regions in antibody :
- (1) are restricted to light chains
 - (2) are at the hinge region
 - (3) are at the C-terminal end of the Ig peptide chains
 - (4) are concerned in antigen recognition
38. Which of the following combinations generate increased T-cell receptor diversity ?
- (1) VJ recombination
 - (2) VDJ recombination
 - (3) VGJ recombination
 - (4) VDDJ recombination
39. Electron microscopes have greater resolving power than light microscopes because :
- (1) electron microscopes have more lenses
 - (2) the wavelength of electrons is much longer than the wavelength of visible light
 - (3) the beams in electron microscopes overlap creating a clearer picture
 - (4) the wavelengths in visible light are longer than the electrons

40. Cytokines always act :

- (1) By binding to specific receptors
- (2) In antagonistically with other cytokines
- (3) Synergistically with other cytokines
- (4) In an autocrine fashion

Short Answer Questions

Note: Attempt any **five** questions. Write answer in **150-200** words. Each question carries **16** marks. Answer each question on separate page, after writing Question Number.

01. Discuss the symptoms and affected pathway in Maple Syrup Urine disease. Write about the treatment options available for different types of MSUD patients.
02. Explain the role of different components of electron transport chain.
03. Explain major differences between different types of enzymatic inhibition (competitive, non-competitive and uncompetitive.)
04. What is the cyclic and non-cyclic photo-phosphorylations. Name the complexes associated with thylakoid membrane.
05. Draw the structure of cyanocobalamin as a coenzyme and write its functions.
06. Name the small nuclear of RNAs involved in post-transcriptional processing.
07. What is the importance of plasmids for recombinant DNA technology ?
08. What are differences between isotopic, allotypic and idiotypic determinants of immunoglobulins ? Why occasionally allotypic responses is seen between different individuals of the same species ?

- 09.** How nucleosome is different from solenoid structure ? Describe various levels of chromosomal organization in eukaryotic cells.
- 10.** What is the mechanism of Polymerase Chain Reaction ? Differentiate between Real Time PCR and Reverse Transcriptase PCR ?

Question No.

Page for Short Answer

Question No.

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Question No.

Page for Short Answer

ROUGH WORK

रफ़ कार्य

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली-काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में लिफाफा रहित प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. अपना अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से निर्धारित स्थान पर लिखें।
5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त केवल ओ एम आर उत्तर-पत्र परीक्षा भवन में जमा कर दें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।