

2016.

Set No. : I

Question Booklet No.

RET/16/TEST-B

987

Human and Clinical Genetics

(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

27.

ST/AL

**RET/16/TEST-B**

**987/Human and Clinical Genetics**

**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।

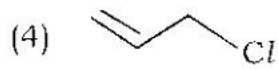
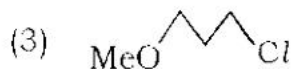
**(3)** Answer only **5** Short Answer Questions. Each question carries **16 (Sixteen)** marks and should be answered in **150-200** words. Blank **5 (Five)** pages attached with this booklet shall only be used for the purpose. Answer each question on separate page, after writing Question No.

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।

01. 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

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



03. 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)  $\Delta S_{sur} + \Delta S_{sys} < 0$

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

(1) aqueous formaldehyde

(2) aqueous ferrous sulphate

(3) aqueous formic acid

(4) aqueous ferric alum

**05.** 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.

**06.** 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.

**07.** During respiration, energy is released. It is stored in the form of :

- (1) ADP                      (2) ATP                      (3) NADP                      (4) APP

**08.** Which of the following is known as Royal disease :

- (1) Sickle cell anemia                      (2) Haemophilia
- (3) Alzheimers disease                      (4) Colour blindness

**09.** 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. Syndismology is the study of :

- (1) Ligaments and bones  
(2) Syndromes  
(3) Joint articulations and ligaments  
(4) Monstrols

12. Malacology is the study of :

- (1) Shells                      (2) Molluscs  
(3) Muscles                      (4) Mammals

13. The technique which helped in deciphering DNA structure is :

- (1) X-ray crystallography                      (2) Electron microscope  
(3) Spectrophotometry                      (4) Histochemistry

14. Electric field is used in separating chemicals in :

- (1) Ion exchange chromatography  
(2) Electrophoresis  
(3) Thin layer chromatography  
(4) Column chromatography

15. Mineral element present in cytokinins :

- (1) potassium (3) (2) Zinc  
(3) Iron (4) Manganese

16. Purines possess nitrogen at :

- (1) 1,2,4 and 6 positions (4) (2) 1,3,5 and 7 positions  
(3) 1,3,7 and 9 positions (4) 1,2,6 and 8 positions

17. Nucleosome core is made up of :

- (1) H1,H2A, H2B and H3 (4) (2) H1,H2A,H2B and H4  
(3) H1,H2A,H2B,H3,and H4 (4) H2A,H2B, H3 and H4

18. Number of Barr bodies in human female suffering from Down syndrome would be :

- (1) 3 (2) 1 (2) (3) 2 (4) zero

19. Adaptor molecule is :

- (1) mRNA (4) (2) rRNA  
(3) DNA (4) tRNA

20. Microsatellite sequences are repeat units with base pairs :

- (1) 1-6 (1) (2) 5-30 (3) 11-60 (4) 20-100

21. polyploidy is induced through :

- (1) Colchicine (1) (2) Irradiation  
(3) Mutagenic chemicals (4) Ehtylene

22. Iodine is a component of :

- (1) Nitrate reductase (2) Hormone thyroxine  
(3) Hormone TSH (4) Nitrogenase

23. Water is end product in :

- (1) Glycogenolysis (2) Hydrostatic skeleton  
(3) Respiration (4) Carbon assimilation

24. Side chain of amino acid is complex in :

- (1) Glycine (2) Valine  
(3) Tryptophan (4) Alanine

25. Two strands of DNA are held together by bond of :

- (1) Nitrogen (2) Hydrogen  
(3) Oxygen (4) Carbon

26. Ozone is absent in :

- (1) Troposphere (2) Mesosphere  
(3) Stratosphere (4) Ionosphere

27. Which of the following has been basic to origin of life :

- (1) Carbohydrate (2) Proteins  
(3) Nucleic acid (4) Nucleoproteins



28. Frequency of an allele may change in isolated populations due to :

- (1) Genetic drift (1) (2) Mutations  
(3) Natural selection (4) Gene flow

29. Recombination of genes occurs at :

- (1) Prophase of mitosis (2) Prophase of I of meiosis  
(3) Metaphase of II of meiosis (4) Prophase of II of meiosis

30. Cranial capacity of humans is :

- (1) 915 cc (2) 1470 cc  
(3) 1600 cc (4) 1700 cc

31. Vision of cockroach is :

- (1) Monocular (3) (2) Binocular  
(3) Mosaic (4) Superposed

32. Formation of platelets is known as :

- (1) Haemopoiesis (2) Thrombopoiesis  
(3) Haemolysis (4) Haemodialysis

33. The back cross is :

- (1) A cross between F1 individual and F2 individual
- (2) A cross between an F1 individual with another F1 individual
- (3) Cross between F1 and one of the two parents
- (4) Cross between F2 with one of the parents

34. A dominant trait is expressed in :

- (1) Homozygous state only
- (2) Heterozygous state only
- (3) Neither homozygous nor heterozygous states
- (4) Both homozygous and heterozygous states

35. Chromatid is ;

- (1) One half of chromosome.
- (2) Haploid chromosome.
- (3) Complete chromosome.
- (4) Duplicate chromosome.

36. A normal women is married to a colour blind man. The children are expected to be :

- (1) All normal
- (2) 50% sons are colour blind
- (3) All daughters are normal but carrier whereas all sons are normal phenotypically as well genotypically
- (4) 50% daughters are colour blind

37. Process of genetic mutation is :

- (1) Reversible
- (2) Irreversible
- (3) Partially reversible
- (4) Continuous

38. Map distance of genes is calculated by :

- (1) Number of mutant genes
- (2) Cross over percentage
- (3) Non cross-over percentage
- (4) Recombination frequency of gene locus

2

39. Philadelphia chromosome occurs in patients suffering from :

- (1) Leukimia
- (2) Rickets
- (3) Hepatitis
- (4) Albinism

1

40. A muted gene that causes cancer is called :

- (1) Mutagen
- (2) Carcinogen
- (3) Oncogene
- (4) Human Papilloma Virus (HPV)

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**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.** Write short note on Restriction Endonuclease.
- 02.** Briefly describe about the Pharmacogenomics.
- 03.** Elucidate the chromatin structure by drawing suitable diagram.
- 04.** What are the steps for Fluorescence in Situ Hybridizations (FISH), discuss in detail ?
- 05.** Discuss how Fanconi anaemia genetic test is done.
- 06.** Discuss in detail how invasive-prenatal diagnosis is done.
- 07.** What is the principle of High Performance Liquid Chromatography (HPLC) ?
- 08.** What is immunotherapy ?
- 09.** What is Homocystinuria, discuss in detail ?
- 10.** What is Assisted Reproductive Technology (ART).

Question No.

Page for Short Answer

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Question No.

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Question No.

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**ROUGH WORK**

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## 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 इसका 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 वा भरा 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।