

Set No. : 1

**RET/14/TEST-B**

Question Booklet No.

**746**

**Genetics & Plant Breeding**

*(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 10 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 : 16**

**RET/14/TEST-B**

**746/Genetics & Plant Breeding**

**ROUGH WORK**

रफ़ कार्य

**No. of Questions : 50**

**Time : 2 Hours**

**Full Marks : 200**

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

- 01.** Which one of the following is **not** a kharif crop :
- |             |           |
|-------------|-----------|
| (1) Paddy   | (2) Maize |
| (3) Mustard | (4) Arhar |
- 02.** Select the crop, which is used for green manuring :
- |                       |               |
|-----------------------|---------------|
| (1) Daincha (sunhemp) | (2) Sugarcane |
| (3) Tobacco           | (4) Onion     |
- 03.** Panama wilt disease is found in :
- |            |            |
|------------|------------|
| (1) Papaya | (2) Mango  |
| (3) Peach  | (4) Banana |
- 04.** Osmotic expansion of a cell kept in water is chiefly regulated by :
- |               |                  |
|---------------|------------------|
| (1) Ribosomes | (2) Mitochondria |
| (3) Plastids  | (4) Vacuoles     |
- 05.** Community Development Programme was started in :
- |          |          |
|----------|----------|
| (1) 1952 | (2) 1965 |
| (3) 1957 | (4) 1960 |
- 06.** Food grains have :
- |                              |                                |
|------------------------------|--------------------------------|
| (1) Inelastic demand         | (2) Elastic demand             |
| (3) Perfectly elastic demand | (4) Perfectly inelastic demand |
- 07.** The disease "ricket" in animal is caused due to deficiency of :
- |               |               |
|---------------|---------------|
| (1) Vitamin A | (2) Vitamin B |
| (3) Vitamin C | (4) Vitamin D |
- 08.** For comparing the variability of the two series, which one of the following measures is used :
- |                        |                              |
|------------------------|------------------------------|
| (1) Standard Deviation | (2) Mean Deviation           |
| (3) Range              | (4) Coefficient of Variation |

09. Which one of the following is an anticoagulant :

- |             |                 |
|-------------|-----------------|
| (1) Heparin | (2) Interleukin |
| (3) Plasmin | (4) Lymphokine  |

10. The fertility of soil is reduced by :

- |                              |                        |
|------------------------------|------------------------|
| (1) Alternate cropping       | (2) Intensive cropping |
| (3) Nitrogen fixing bacteria | (4) None of the above  |

11. A particular gene that controls seed coat colour in peas also determines the susceptibility of these peas to a particular disease. The situation is referred to as :

- |                 |                        |
|-----------------|------------------------|
| (1) Variegation | (2) Additive dominance |
| (3) Codominance | (4) Pleiotropy         |

12. The fundamental Mendelian process which involves the separation of contrasting genetic elements at the same locus would be called :

- |                          |                             |
|--------------------------|-----------------------------|
| (1) Segregation          | (2) Independent assortment  |
| (3) Continuous variation | (4) Discontinuous variation |

13. In artificial seeds the somatic embryo is encapsulated in shell of :

- |                          |               |
|--------------------------|---------------|
| (1) Poly ethylene glycol | (2) Silica    |
| (3) Calcium alginate     | (4) Cellulose |

14. Male sterility can be induced by alloplasmic association in :

- |                     |                      |
|---------------------|----------------------|
| (1) Vibrids         | (2) Somatic hybrids  |
| (3) Synthetic seeds | (4) Meristem culture |

15. Primary antibody is the probe in :

- |                                 |                                 |
|---------------------------------|---------------------------------|
| (1) Southern blotting technique | (2) Northern blotting technique |
| (3) Western blotting technique  | (4) MALDI-TOF                   |

16. The triplet code of CTG in DNA is represented as in mRNA and in tRNA as :
- |              |              |
|--------------|--------------|
| (1) CAT, GUG | (2) GAC, CUG |
| (3) GAG, GUG | (4) TAG, UGU |
17. The X-rays diffraction studies for determining the key to DNA structure was conducted by :
- |                 |              |
|-----------------|--------------|
| (1) McClintock  | (2) Franklin |
| (3) T.H. Morgan | (4) Chargaff |
18. Which of the following is not a stage of aerobic respiration ?
- |                     |                              |
|---------------------|------------------------------|
| (1) Glycolysis      | (2) Pyruvate oxidation       |
| (3) The Krebs cycle | (4) Electron transport chain |
19. The electron transport chain pumps protons :
- (1) Out of the mitochondrial matrix into intermembrane space.
  - (2) Out of the intermembrane space and into the matrix.
  - (3) Out of the mitochondrion and into the cytoplasm
  - (4) Out of the cytoplasm and into the mitochondrion.
20. In respiration, if energy is not converted in ATP this will be :
- (1) Liberated along with CO<sub>2</sub>
  - (2) Converted into heat
  - (3) Transferred to organic compounds
  - (4) Transferred to water
21. The final electron acceptor of the electron transport chain that functions in aerobic oxidative phosphorylation is :
- |              |                      |
|--------------|----------------------|
| (1) Pyruvate | (2) Oxygen           |
| (3) ADP      | (4) NAD <sup>+</sup> |

22. Mitochondria are self-replicating organelle because they have :
- (1) Thylakoids (2) Oxysomes  
(3) Ribosomes (4) DNA
23. Which of the following enzymes cuts the DNA molecule ?
- (1) DNA ligase (2) DNA polymerase  
(3) Restriction enzyme (4) Reverse transcriptase
24. Extension of NCD III was suggested by :
- (1) Comstock and Robinson (1952)  
(2) Kearsey and Jinks (1968)  
(3) Jinks and Hayman (1953)  
(4) J.L. Jinks (1956)
25. Average effect of gene substitution ( $\alpha$ ) is :
- (1)  $\alpha_1 - \alpha_2$  (2)  $\alpha_1 + \alpha_2$   
(3)  $\alpha_1 \times \alpha_2$  (4)  $\alpha_1 / \alpha_2$
26. Over-dominance is revealed when the estimate of average degree of dominance is :
- (1)  $< 1$  (2)  $> 1$   
(3)  $= 1$  (4)  $> 0 < 1$
27. The estimate of non additive gene effect in the actual performance of a cross combination is obtained by :
- (1) GCA effect (2) SCA effect  
(3) Dominance effect (4) Epistatic effect

28. Law relating to gene and genotype frequencies in a large random mating population was given by :
- (1) B.I. Hayman (2) J.L. Jinks  
(3) K. Mather (4) Hardy-Weinberg
29. Generation mean analysis with six generation of a cross provides the estimates of
- (1) m, d and h (2) m, d, h and i  
(3) m, d, h, i and j (4) m, d, h, i, j and I
30. Additive genetic variance ( $V_A$ ) which is the variance of breeding values, is estimated by the formula ?
- (1)  $2pq\alpha^2$  (2)  $4pq\alpha^2$   
(3)  $pq\alpha^2$  (4)  $\frac{1}{2}pq\alpha^2$
31. From 8 inbreds, all possible double crosses will be :
- (1) 28 (2) 56  
(3) 210 (4) 64
32. For developing high yielding varieties in self pollinated crops, we mostly use :
- (1) Pure line method (2) Pedigree method  
(3) Bulk method (4) Back cross method
33. Population Improvement is commonly used in :
- (1) Maize (2) Wheat  
(3) Rice (4) Pea
34. Who is known as Father of Hybrid Rice ?
- (1) M.S. Swaminathan (2) G.S. Khush  
(3) Yuan Long Ping (4) N.E. Borlaug



35. A condition in which chromosome number is **not** an exact multiple of the haploid set is termed as :
- (1) Autopolyploid (2) Aneuploidy  
(3) Autopolyploidy (4) Amphidiploidy
36. The method of Recurrent selection for SCA was given by :
- (1) Lonnquist (2) Darwin  
(3) Hull (4) Sprague
37. A trihybrid plant (Aa Bb Cc) on selfing will produce following number of genotypes :
- (1) 3 (2) 27  
(3) 16 (4) 64
38. Single Seed Descend Method is a modification of :
- (1) Pedigree Method (2) Bulk Method  
(3) Back cross method (4) Recurrent selection
39. Which of the following is not needed in PCR reaction :
- (1) DNA polymerase (2) Primase  
(3) Primers (4) Deoxynucleoside triphosphate
40. Non-PCR based Marker is L
- (1) RAPD (2) AFLP  
(3) SSR (4) RFLP

**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 factors affecting genetic advance under selection in self pollinated crop species.
- 02.** Compare the efficiency of NCD I and NCD II.
- 03.** Briefly describe the *Vr-Wr* graph of dialled analysis in relation to nature of dominance and types of genes present in parents.
- 04.** Discuss Back Cross Method for transferring a recessive gene from donor to a recipient variety.
- 05.** Describe Heterosis and its status of exploitation in self pollinated crops.
- 06.** Discuss the various steps for rapid introgression of a gene in a cultivated variety using molecular markers.
- 07.** Define Mapping Population and discuss the advantages the limitation of  $F_2$ , DH and RILs.
- 08.** Discuss all the steps for developing a AFLP marker in crop plants.
- 09.** Briefly describe the method of bacterial conjugation and genetic recombination in *E. coli*.
- 10.** How Southern blot hybridization detects a specific DNA fragment in a complex mixture of restriction fragments ? Describe the procedure with the help of suitable diagramme.

**Question No.**

**Page for Short Answer**

**प्रश्न संख्या**

**लघु उत्तरीय के लिए पृष्ठ**

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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 10 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।