Question Paper Specific Instructions

Please read each of the following instructions carefully before attempting questions:

There are EIGHT questions in all, out of which FIVE are to be attempted.

Questions no. 1 and 5 are compulsory. Out of the remaining SIX questions, THREE are to be attempted selecting at least ONE question from each of the two Sections A and B.

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

All questions carry equal marks. The number of marks carried by a question/part is indicated against it.

Answers must be written in ENGLISH only.

Neat sketches may be drawn, wherever required.

SECTION A

Q1. Explain each of the following: \( 8 \times 5 = 40 \)

(a) Suggest why prions should not be included among viruses. \( 8 \)

(b) Discuss the role of central control system in managing surveillance at check points during cell cycle. \( 8 \)

(c) Give two popular examples where genetic differences influence induction of mutation. \( 8 \)

(d) Is the genetic code universal? \( 8 \)

(e) Explain Binomial and Poisson distribution. \( 8 \)
Q2.  
(a) Describe nuclear pores and their role in nucleocytoplasmic traffic with suitable diagrams.  
(b) How will you distinguish cytologically between paracentric inversion and pericentric inversion?  

10+10=20

Q3.  
(a) \frac{X}{A} ratio is not only a primary sex determining signal but has several major regulatory genes in function. Discuss what role do they play in sex differentiation, with suitable examples.  
(b) Describe multigene families with divergent members of globin genes and pseudogenes subject to the difference in expression to the time and space.  

20

5+15=20

Q4.  
(a) Why is Agrobacterium tumefaciens the most popular and important tool in genetic engineering of plant systems? Describe the various steps used in T-DNA mediated transfer of foreign genes into plants.  
(b) What are the merits of pedigree methods? Describe the pedigree-bulk methods developed at CIMMYT, Mexico for wheat breeding.  

5+15=20

8+12=20
SECTION B

Q5. Write brief notes on each of the following: 8x5=40

(a) “Tricarboxylic acid cycle is an amphibolic process.” Explain. 8
(b) “Phenolic substances are not mere metabolic waste products.” Discuss. 8
(c) What is ‘triple response growth’? How is it induced? 8
(d) How does El Niño result in extensive disruption of weather around the world? 8
(e) Describe the phenomenon of ‘biomagnification’ with special reference to chlorinated hydrocarbons. 8

Q6. (a) In what way does carbon fixation pathway in malate formers differ from that in aspartate formers? 20
(b) Trace the physiological changes associated with the process of seed germination. How is the process of germination regulated by phytohormones? 15+5=20

Q7. (a) How do seasonal variations in day length conditions influence flowering patterns of plants? Give a comprehensive account of the structure and mode of action of the photoreceptor involved. 10+10=20
(b) What are ‘carrier proteins’? Describe the ion uptake mechanism in plants mediated by carrier proteins. 5+15=20

Q8. (a) Write an account of ‘Joint Forest Management Programme’ (JFMP). How does people’s participation ensure sustainable forest resource management? 15+5=20
(b) Discuss the strategies adopted for phytoremediation. Add a critical note on potentialities and limitations of phytoremediation to clean up heavy metal contaminated sites. 10+10=20