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Register no :

Date :11-03-202

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**B.Sc. BIOTECHNOLOGY- I SEM**

**END SEMESTER EXAMINATION: October 2021**

(Exams conducted March 2022)

**BT 121:** **Cell Biology and Genetics**

**Time: 3 Hrs Max Marks: 100**

**Note The question paper has THREE parts and TWO printed pages**

1. **Answer any Ten of the following 10x2=20**
2. What is Nucleolar Organizing Region?
3. Define Microtubule Organizing Center with examples?
4. What is ATP synthase and what is its function?
5. What are the factors that affect fluidity of cell membrane?
6. What is telomere and what is its significance?
7. Define karyotype?
8. What is a test cross conducted for? Give the test cross ratio for a dihybrid.
9. What is trisomy? What are the different types of trisomics?
10. What are frameshift mutations? What is its genetic effect?
11. What is sex index ratio in Drosophila?
12. What is recombination frequency? What is its contribution to gene mapping?
13. State four important characteristics of multiple alleles.
14. **Answer any Five of the following 5x7=35**
15. Explain cyclic photophosphorylation with a diagram?
16. Explain 9+2 arrangement of microtubules?
17. Give an account of chemical composition of chromatin?
18. Give an account of the origin of bread wheat.
19. Explain the inheritance of Kappa particles in *Paramoecium*.
20. With the help of a suitable example, explain inhibitory epistasis.
21. Explain sex determination operant in *Melandrium sps.*
22. **Answer the following 3x15=45**
23. The Black Langshan breed of chicken has feathered shanks. When crossed to Buff Rock breed of chicken with unfeathered shanks, the F1 all have feathered shanks. Out of 360 F2 progeny, 24 were found to have unfeathered shanks, while 336 had feathered shanks.
24. What is the type of interaction in this trait?
25. What is the proportion of feathered F2 would be expected to be heterozygous at one locus and homozygous at the other?
26. a. Explain electron transport chain.

 **OR**

 b. Illustrate the features of cell cycle with a neat, labelled diagram.

1. a. A dominant gene *K* produced kinked tails, recessive gene at this locus *kk* produces normal tails. The homozygous condition of another locus *AA* produces a gray colour called Agouti, the heterozygous genotype *A’A* produces yellow coat colour while the homozygous *A’A’* is lethal.
2. If yellow-coloured mice, heterozygous for kinked tails are crossed together, what phenotypic proportions are expected in their progeny?
3. What proportion of the progeny is expected to be of genotype *A’AKk* ?

 **OR**

b. A kidney- bean shaped eye is produced by a recessive gene k in Drosophila. Orange eye colour called ‘cardinal’ is produced by the recessive gene cd on the same chromosome. Between these 2 genes, there is a recessive gene e that governs ebony body colour. Homozygous kidney, cardinal females are mated to homozygous ebony males. The trihybrid F1 females are test crossed. The following progeny are produced.

1761 kidney, cardinal 97 kidney

1773 ebony 89 ebony, cardinal

128 kidney, ebony 6 kidney, ebony, cardinal

138 cardinal 8 wild type

1. Determine the linkage relationships in parents and F1 trihybrids.
2. Estimate the map distances.