KAKATIYA UNIVERSITY
B.Sc III Year
Botany- Paper III
(Cell biology, Genetics, Ecology and Biodiversity)
Model question paper – Theory

Time : 3 hours
Max. Marks : 100

SECTION – A
(Instructions to the question PAPER SETTER: Set TWO questions from Each Unit of the given syllabus)
Define or explain ALL of the following (8x2 =16 Marks)

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  

SECTION – B
(Instructions to the question PAPER SETTER: Set TWO questions from Each Unit of the given syllabus)
Write short answers for ALL of the following (4 x 6 = 24 Marks)

9. (a) UNIT - I  
   (OR)
   (b) UNIT - II
10. (a) UNIT - III
    (OR)
    (b)
11. (a) UNIT - IV
    (OR)
    (b)
12. (a) UNIT - I
    (OR)
    (b) UNIT - II
13. (a) UNIT - III
    (OR)
    (b) UNIT - IV
14. (a) UNIT - I
    (OR)
    (b) UNIT - II
15. (a) UNIT - III
    (OR)
    (b) UNIT - IV
16. (a) UNIT - I
    (OR)
    (b) UNIT - II

SECTION – C
(Instructions to the question PAPER SETTER: Set TWO questions from Each Unit of the given syllabus)
Write detailed answers for ALL of the following (4 x 15 = 60 Marks)

13. (a) UNIT - I
    (OR)
    (b) UNIT - II
14. (a) UNIT - III
    (OR)
    (b) UNIT - IV
15. (a) UNIT - I
    (OR)
    (b) UNIT - II
16. (a) UNIT - III
    (OR)
    (b) UNIT - IV
17. (a) UNIT - I
    (OR)
    (b) UNIT - II
18. (a) UNIT - III
    (OR)
    (b) UNIT - IV
19. (a) UNIT - I
    (OR)
    (b) UNIT - II
20. (a) UNIT - III
    (OR)
    (b) UNIT - IV
21. (a) UNIT - I
    (OR)
    (b) UNIT - II
22. (a) UNIT - III
    (OR)
    (b) UNIT - IV
23. (a) UNIT - I
    (OR)
    (b) UNIT - II
24. (a) UNIT - III
    (OR)
    (b) UNIT - IV
25. (a) UNIT - I
    (OR)
    (b) UNIT - II
26. (a) UNIT - III
    (OR)
    (b) UNIT - IV
27. (a) UNIT - I
    (OR)
    (b) UNIT - II
28. (a) UNIT - III
    (OR)
    (b) UNIT - IV
29. (a) UNIT - I
    (OR)
    (b) UNIT - II
30. (a) UNIT - III
    (OR)
    (b) UNIT - IV
31. (a) UNIT - I
    (OR)
    (b) UNIT - II
32. (a) UNIT - III
    (OR)
    (b) UNIT - IV
33. (a) UNIT - I
    (OR)
    (b) UNIT - II
34. (a) UNIT - III
    (OR)
    (b) UNIT - IV
35. (a) UNIT - I
    (OR)
    (b) UNIT - II
36. (a) UNIT - III
    (OR)
    (b) UNIT - IV
37. (a) UNIT - I
    (OR)
    (b) UNIT - II
38. (a) UNIT - III
    (OR)
    (b) UNIT - IV
39. (a) UNIT - I
    (OR)
    (b) UNIT - II
40. (a) UNIT - III
    (OR)
    (b) UNIT - IV
41. (a) UNIT - I
    (OR)
    (b) UNIT - II
42. (a) UNIT - III
    (OR)
    (b) UNIT - IV
43. (a) UNIT - I
    (OR)
    (b) UNIT - II
44. (a) UNIT - III
    (OR)
    (b) UNIT - IV
45. (a) UNIT - I
    (OR)
    (b) UNIT - II
46. (a) UNIT - III
    (OR)
    (b) UNIT - IV
47. (a) UNIT - I
    (OR)
    (b) UNIT - II
48. (a) UNIT - III
    (OR)
    (b) UNIT - IV
49. (a) UNIT - I
    (OR)
    (b) UNIT - II
50. (a) UNIT - III
    (OR)
    (b) UNIT - IV
51. (a) UNIT - I
    (OR)
    (b) UNIT - II
52. (a) UNIT - III
    (OR)
    (b) UNIT - IV
53. (a) UNIT - I
    (OR)
    (b) UNIT - II
54. (a) UNIT - III
    (OR)
    (b) UNIT - IV
55. (a) UNIT - I
    (OR)
    (b) UNIT - II
56. (a) UNIT - III
    (OR)
    (b) UNIT - IV
57. (a) UNIT - I
    (OR)
    (b) UNIT - II
58. (a) UNIT - III
    (OR)
    (b) UNIT - IV
59. (a) UNIT - I
    (OR)
    (b) UNIT - II
60. (a) UNIT - III
    (OR)
    (b) UNIT - IV

1
SECTION – A
Define or explain ALL of the following (8x2 = 16 Marks)

1. Nucleotide
2. Heterochromatin
3. Law of segregation
4. Aneupolid
5. Food chain
6. Hydrosere
7. UNEP
8. Hot spot

SECTION – B
Write short answers for ALL of the following (4 x 6 = 24 Marks)

9. (a) Cell cycle  
   (OR)  
   (b) Lambrush chromosome
10. (a) Epistasis  
    (OR)  
    (b) Transition
11. (a) Ecosystem  
     (OR)  
     (b) Ecad
12. (a) Red data book  
     (OR)  
     (b) Endemism

SECTION – C
Write detailed answers for ALL of the following (4 x 15 = 60 Marks)

13. (a) Describe replication of DNA  
    (OR)  
    (b) Describe different stages in mitosis
14. (a) What are molecular basis of mutations  
    (OR)  
    (b) Write the structure of pBR - 322 plasmid
15. (a) Discuss the energy flow in ecosystem  
    (OR)  
    (b) What are biogeochemical cycles? Explain N₂ cycle.
16. (a) Discuss the principle of conservation.  
    (OR)  
    (b) Explain the role of NBPGR in the conservation of biodiversity.
Practical – III: Cell Biology, Genetics, Ecology and Biodiversity
Practical Syllabus
MODEL QUESTION PAPER

Time: 3 Hrs

Maximum: 50 Marks

I. Major Experiment (ONE) : 15 Marks

II. Minor Experiment (ONE) : 10 Marks

III. Scientific Observations (ONE) : 5 Marks

IV. Critical notes on spotters of scientific interest (FIVE) (5×2): 10 Marks

V. Plant Collection from Botanical Tour : 5 Marks

VI. Record : 5 Marks
Practical – III : Cell Biology, Genetics, Ecology and Biodiversity
Practical Syllabus
QUESTION BANK

Time : 3 Hrs
Maximum : 50 Marks

I. Major Experiments : 15 Marks

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparations of onion root tips.
4. Study of plant community by quadrat method.
5. Estimation of chemical oxygen demand (COD) in a given water sample.
6. Estimation of O₂ in given water samples.
7. Estimation of chlorides in given water samples.

II. Minor Experiments : 10 Marks

9. Solving genetic problems related to monohybrid, dihybrid ratio and interaction of genes (Minimum of six problems in each topic). See annexure-I.
10. Demonstration of soil texture (composition of clay, sand silt etc.) pH.
11. Estimation of water purity in given water samples.

III. Scientific Observations : 5 Marks

12. Study in the ultra structure of cell organelles using electron microphotographs.
13. Geographical spotting of certain endemic and endangered plant species of A.P.
14. Minimum of two field visits to local areas of ecological/conservation of biodiversity Importance (Sacred grove/Reserved Forest/Botanical garden/Lakes etc.)

IV. Critical notes on spotters of scientific interest : 10 Marks

15. Salivary gland chromosome
16. Lampbrush chromosome
17. Solenoid model of chromosome structure
18. Operon model
19. *Mirabilis jalapa*
20. *Eichhornia*
21. *Hydrilla*
22. *Pistia*
23. *Nymphaea*
24. *Vallisnaria*
25. *Asperagus*
26. *Opuntia*
27. *Euphorbia antiquorum*
28. *Rhizophora*
29. *Avecenia*

V. Plant Collection from Botanical Tour : 5 Marks

VI. Record : 5 Marks
9. Monohybrid cross:

(i). In pea, tall plant is dominant over dwarf plant. If a homozygous tall is crossed with a dwarf plant, describe (i) the genotypes and phenotypes of F₁ and F₂ progeny, (ii) the gametes produced by F₁ and (iii) the genotypes and phenotypes of test cross and back cross progeny.

(ii). In pea, yellow cotyledon is dominant over green cotyledon colour. A plant heterozygous for yellow cotyledon is crossed with a plant homozygous for green cotyledon colour. Determine the gametes produced by these plant, and the genotypes and the phenotypes of progeny obtained from their cross.

(iii). In a cross between two parents 22 plants are round and 8 plants are wrinkled. Find out the genotype of the parents involved in the above cross.

(iv). What gametes will be produced by the plants involved in the following four crosses and what will be the size of the offspring from each cross.

(i) TT x Tt  (ii) Tt xTt (iii) TT x tt (iv) Tt x tt.

(v). A tall plant is crossed with a dwarf plant. In the progeny, about one-half of the plants are tall and the renaming one-half dwarf. Determine the genotypes of the tall and dwarf plants.

(vi). In Mirabilis (Four ‘O’ clock), a plant hybrid for red ® and whiter flowers ® had pink flower (Rr). A plant with pink flowers is crossed with one having red flowers and with another having white flowers. Give the genotypic and phenotypic ratios expected in progenies from these crosses.

9. Dihybrid cross:

(vii) A dwarf pea plant with yellow seed is crossed with a tall plant with green seeds. Give the genotype and phenotype of F₁, the gametes produced by F₁, the genotypes and phenotypes of F₂ and testcross progeny.

(viii) In snapdragon, tall (DD) is dominant dwarf (dd) and red flowers (RR) are incompletely dominant over white (rr), the hybrid being pink. A pure tall white is crossed to a pure dwarf red and the F₁ are self-fertilised. Give the expected genotypes and phenotypes in F₁ and F₂.

(ix).Let Y,y, S and s represent yellow, green, round and wrinkled characters of the seed of Pisum sativum, what will be the colour and shape of the seeds produced by the offspring of the following crosses: (i) YYss x yySS, (ii) Yy Ss x Yyss.

(x). In man, brown eyes (V0 are dominant to blue (b) and dark hairs ® dominant to red hairs (r). A man with brown eyes and red hairs and marries a woman with blue eyes and dark hairs. They have two children, one with brown eyes and red hairs and the other with blue eyes and dark hairs. Give the genotypes of the parents and children.
(xi). In Guinea pigs rough coat colour (R) is dominant over smooth coat (r) and black colour (B) is dominant over white (b). When two pigs are mated the following offspring are formed: 28 rough black, 31 rough white, 11 smooth black, 10 smooth white. Find out the genotypic parents involved in the mating.

(xii). In summer squash white fruit colour is governed by a dominant allele W and yellow fruit colour by its recessive w. A dominant allele at another locus (S) produces disc shaped fruit and its recessive (s) is produces sphere shaped fruit. A homozygous white disc variety of genotype WWSS is crossed with a homozygous yellow sphere variety (wwss). What are the phenotypes expected in the F$_1$, F$_2$ backcross and test cross progenies?

9. Gene interactions:

(xiii). A pure Rose combed chicken is mated with a pure Pea combed chicken. All the F$_1$ are Walnuts. Cross F$_1$Wulnut with Rose and Pea separately and how phenotypes and genotypes.

(xiv). A cross between Rose combed chicken and Walnut combed chicken produced 15 Walnut, 14 Rose, 5 Pea and 6 Single comb offspring. Determine the genotypes of the parents.

(xv). In sweet pea, genes C&P are necessary for coloured flowers. The absence of either or both of these genes the flowers are white. What will be the ratio of the offspring of the following crosses. (i) Cc xccPp (ii) Cc x Ccpp © CcPp x CcPp.

(xvi). Coloured flowered (purple) are dependent on dominant genes C & P. Presence of any one dominant gene fails to produce colour becoming white. A purple flowered plant is crossed with a white flowered plant. 17 Purple and 16 white flowered plants are produced. Give the genotypes of the parents.

(xvii). In mice, black colour of hair is determined by a dominant gene C. Agouti is a wild character which is dependent on dominant gene A. This wild character is expressed when ever it interacts with coloured gene. Albino micro mice are with recessive genes. Find out the ratios of F$_1$ & F$_2$ offsprings resulting from a cross between black and albino mice.

(xviii). In Shepherd purse, triangular fruits are dependent either one or two dominant genes. Top shaped fruits are recessive. A cross was made between two triangular fruited plants. What will be the first shape of offspring?
SECTION – A
(Instructions to the question PAPER SETTER: Set TWO questions from Each Unit of the given syllabus)
Define or explain ALL of the following (8x2 = 16 Marks)
1.
2.
3.
4.
5.
6.
7.
8.

SECTION – B
(Instructions to the question PAPER SETTER: Set TWO questions from Each Unit of the given syllabus)
Write short answers for ALL of the following (4 x 6 = 24 Marks)
9. (a) UNIT - I (OR)
   (b)
10. (a) UNIT - II (OR)
    (b)
11. (a) UNIT - III (OR)
    (b)
12. (a) UNIT - IV (OR)
    (b)

SECTION – C
(Instructions to the question PAPER SETTER: Set TWO questions from Each Unit of the given syllabus)
Write detailed answers for ALL of the following (4 x 15 = 60 Marks)
13. (a) UNIT - I (OR)
    (b)
14. (a) UNIT - II (OR)
    (b)
15. (a) UNIT - III (OR)
    (b)
16. (a) UNIT - IV (OR)
    (b)
KAKATIYA UNIVERSITY
B.Sc III Year
Botany- Paper IV
(Physiology, Tissue culture, Biotechnology, Seed technology and Horticulture)
Model question paper – Theory

Time : 3 hours
Max. Marks : 100

SECTION – A
Define or explain ALL of the following (8x2 = 16 Marks)

1. Imbibition
2. Photosystem
3. Auxin
4. Phytochrome
5. Protoplast
6. Transgenics
7. Bonsai plant
8. Bud grafting

SECTION – B
Write short answers for ALL of the following (4 x 6 = 24 Marks)

9. (a). Nomenclature of enzymes
   (OR)
   (b) Photophosphorylation
10. (a). Biological nitrogen fixation
    (OR)
    (b). Cytokinines
11. (a). Cybrids
    (OR)
    (b). Synthetic seeds
12. (a) Seed banks
    (OR)
    (b) Importance of green house

SECTION – C
Write detailed answers for ALL of the following (4 x 15 = 60 Marks)

13. (a) Describe mechanism of stomatal movement
    (OR)
    (b) Give an account of C_4 cycle
14. (a) Discuss about pentose phosphate pathway
    (OR)
    (b) Write briefly about protein synthesis
15. (a) Discuss the importance of somatic hybrids in the improvement of crop plants
    (OR)
    (b) What is r-DNA? Describe various steps involved in the construction of r-DNA.
16. (a) What is seed dormancy? Describe the causes and methods of breaking seed dormancy
    (OR)
    (b) Describe the role of growth regulators in horticulture
<table>
<thead>
<tr>
<th>Section</th>
<th>Marks</th>
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<tbody>
<tr>
<td>I. Major Experiment (ONE)</td>
<td>15</td>
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<tr>
<td>II. Minor Experiment (ONE)</td>
<td>10</td>
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<tr>
<td>III. Scientific Observations (ONE)</td>
<td>5</td>
</tr>
<tr>
<td>IV. Critical notes on spotters of scientific interest (FIVE)</td>
<td>(5x2): 10</td>
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<tr>
<td>V. Project Work</td>
<td>5</td>
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<tr>
<td>VI. Record</td>
<td>5</td>
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Practical – IV : Physiology, Tissue culture, Biotechnology, Seed Technology and Horticulture

Practical Syllabus
QUESTION BANK

Time: 3 Hrs
Maximum : 50 Marks

I. Major Experiments : 15 Marks

1. Determination of osmotic potential of vacuolar sap by plasmolytic method using leaves of *Rhoeo/ Tradenscantia*.
2. Determination of stomatal frequency using leaf epidermal peeling.
4. Estimation of protein by biuret method/ Lowry et al method
5. Estimation of DNA

II. Minor Experiments : 10 Marks

7. Determination of catalase activity using plant material/photographs.
8. Demonstration of seed dressing using fungicide to control diseases.
9. Demonstration of seed dressing using biofertiliser (*Rhizobium*) to enrich nutrient supply.
10. Demonstration of Micropropagation using explants like axillary buds and shoot meristems.

III. Scientific Observations : 5 Marks

11. Study of mineral deficiency symptoms using plant material/ photographs.
12. Study of non-dormant seed germination: Breaking of seed dormancy caused by hard seed coat using scarification technique.
13. Study of the application of plant growth regulator (IBA and NAA) for rooting of cuttings using Ornamental plants.
15. Study visits to places of horticultural and biotechnological interest-Commercial nurseries/ Botanical gardens; Biotechnology R & D laboratories/Industries

IV. Critical notes on spotters of scientific interest : 10 Marks

16. Spade
17. Pick-axe
18. Shade net (photo)
19. Glass house (photo)
20. Mist chamber (photo)
21. Antibiotics
22. Vaccines
23. Biofertilisers
24. Single Cell Protein
25. Cosmetics
26. Multiple shoots
27. Somatic embryos
28. Artificial/ Synthetic seeds

V. Project Work : 5 Marks

VI. Record : 5 Marks
MODEL QUESTION PAPER FOR PRACTICAL EXAMINATION
&
SCHEME FOR EVALUATION

Time: 3 h
Maximum Marks: 50

Note: Questions to be set based on prescribed Laboratory Exercises in the following pattern

I. Major Laboratory Exercise: 15 Marks

- For in-depth testing of scientific and major technical skill of students.
- Perform/conduct the experiment or prepare the given material by taking sections and doing staining for scientific study.

*Scheme for valuation:* Procedure- 3 marks + Experimentation -6 marks + Observations or Recording of results – 3 marks + Discussion – 3 marks (Total: 15 marks).

II. Minor Laboratory Exercise: 10 Marks

- To test minor technical skill of students.
- Make suitable minor preparation of the given plant material(s) for scientific study.

*Scheme for valuation:* Preparation- 5 marks + Identification - 3 marks + Discussion – 2 marks (Total: 10 marks).

III. Scientific Observation and data analysis: 5 Marks

- Using specimens/ scientific data in a Figure / Photograph/ Table/ Diagram etc.

*Scheme for valuation:* Observations -2 marks + Identification- 1 mark + analysis - 2 marks (Total: 5 marks).

IV. Critical notes on (FIVE) spotters of scientific interest 10 Marks

- Using specimens/ slide/ Photograph/ data in a Figure or Table

*Scheme for valuation:* Identification – 1mark + Notes- 1 mark for each spotter (Total: 10 marks for five spotters).

V. Project Work: 5 Marks

VI. Record(s) and Submission: (Scientific preparations/ collection like preserved specimens, slides, herbarium, working models, clippings of scientific articles, etc.) 5 Marks
Suggested Titles Related to Third Year Syllabus: (For Project Work)

1. Prospecting of plants for alternative (non-conventional) energy sources.
2. Phytoremediation of polluted soils / water.
3. Biodiversity of a habitat.
4. Biodiversity of a selected sacred groove.
5. Study of a natural ecosystems around.
6. Explore the food chain in the local natural ecosystem.
7. Agrobiodiversity of a region.
8. Threatened plants of a region.
10. Invasive plants of a region.
11. Identification of C4 and CAM plants of a region.
12. Mineral deficiency of selected element in plants and its control.
14. Seed variability of commercially available seeds.
15. Applications of antitranspirants.
17. Effects of water stress on growth and development of plants.
18. Micropropagation of endangered or threatened medicinal plants.
19. Production of synthetic seeds.
22. Applications of plant growth regulators in Horticulture.
24. Mineral deficiency of selected elements in plants and its control.
25. Seed quality, storage ad viability of selected crop plant.

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