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Question Paper Code:UC502

B.E./B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Professional Elective

Biotechnology

21BTV502 – PLANT BIOTECHNOLOGY

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Give some important media used for plant tissue culture. CO1- U
2. If the explant is inoculated in the medium containing high concentration of cytokinin, what are the expected results? CO2-App
3. Sketch the successive steps in the mechanism of pathogenesis in plants. CO1- U
4. Compare and contrast the interactions between plants and beneficial microbes versus plants and harmful microbes CO2-App
5. List out the desirable features of a vector. CO1- U
6. Write a short note on lipofection. CO1- U
7. What are RNAi and its purpose? CO1- U
8. Predict the efficient gene editing tools and justify your answer CO2-App
9. Mention the advantages of doing genetic modifications. CO1- U
10. A small seed company in India has developed a GM mustard variety with improved yield and pest resistance. They are seeking approval for commercial release of this variety. Describe the specific regulatory pathway they need to follow, including the key documents and data they will need to submit to the relevant authorities. CO2-App

PART – B (5 x 16= 80 Marks)

11. (a) Write a detailed note on the components present in plant tissue culture media with examples and its role in the medium. CO1- U (16)

Or

- (b) Explain the process of androgenesis and gynogenesis in plant tissue culture. Describe how haploid plants are produced through anther or microspore culture, and discuss the significance of androgenesis in plant breeding. CO1- U (16)
12. (a) Plants live in a microbe- rich environment and must interact with a myriad of pathogenic, commensal, and beneficial microbes. Show how the microbes and plants exist as different forms of interactions with example. CO2- App (16)
- Or
- (b) A farmer is interested in improving soil fertility by promoting biological nitrogen fixation in his legume field. He wants to understand how nitrogen-fixing bacteria convert atmospheric nitrogen (N_2) into ammonia (NH_3) and how environmental factors and gene regulation influence this process? CO2- App (16)
13. (a) Paraphrase the different methods of gene transformation including both direct and indirect methods. CO1- U (16)
- Or
- (b) Explain the biology of *Agrobacterium*, features of Ti plasmid and T-DNA. Also include the neat illustration of genetic organization of T-DNA region. CO1- U (16)
14. (a) T-DNA tagging has emerged to become an important tool in plant physiology and molecular biology. Justify this statement with a clear explanation. CO5 -Ana (16)
- Or
- (b) The CRISPR/Cas9 tool surpasses other programmable nucleases, such as ZFNs and TALENs, for its simplicity and high efficiency. Illustrate the CRISPR/Cas9 tool for the targeted genome editing with a neat explanation. CO5 -Ana (16)
15. (a) Nithya has planned to develop a genetically modified crop as solution for virus infections that damage the crops, suggest him a solution and provide the principle and procedure to implement it. CO2- App (16)
- Or
- (b) Plant-based expression offers a safe, inexpensive and potentially limitless way to produce therapeutics in a quick and flexible manner. Infer this statement with any therapeutic product production in plant system. CO2- App (16)