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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 19BT7HSBFS **Max Marks: 100**
Course: Biotechnology for Society **Date: 24.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) In recent times, the development of modern biotechnology has involved powerful new techniques better known as Molecular Biology that allows scientists to tackle the previous goals with more finesse and speed such as recombinant DNA and genetic engineering, cell fusion, bioprocess and structurally-based molecular design. Given that the technology is new, has immense potential, is rapidly developing, and can be applied to all living beings, it can be used for beneficial purposes but there are also risks. Assess the major ethical implications of various advanced techniques of modern biotechnology. **10**

b) What are the applications of genetic engineering in medicine, research, industry and agriculture? **10**

UNIT - II

2 a) What are transgenic foods? Introduction and commercialization of a transgenic crop intended for human consumption must be approved after nationwide consultation. Justify with a suitable case study in context to India. **06**

b) If food security is primarily a question of distribution insecurity, then how can increased production using GE address the question of food security? **04**

c) As a general rule, conventional breeding develops new varieties by the process of selection, and seeks to achieve expression of genetic material which is already present within a species. What are the conventional breeding techniques used in developing new plant varieties? **05**

d) Give an account on the methods used for cell culture preservation. What are the advantages of freezing? **05**

UNIT - III

3 a) The Human Genome Project is one of the greatest scientific feats in history. The project was a voyage of biological discovery led by an international group of researchers looking to comprehensively study all of the DNA of a select set **10**

of organisms.

i. What is a genome?
ii. What was the Human Genome Project and why has it been important?
iii. What were the goals of the Human Genome Project?
iv. What did the Human Genome Project accomplish?
v. Is the human genome completely sequenced?
vi. What were some of the ethical, legal, and social implications addressed by the Human Genome Project?
vii. What will the next 50 years of medical science look like?
viii. Now that the genome is complete, what's next for National Human Genome Research Institute (NHGRI)?

b) Bioethicists often refer to the four basic principles of health care ethics when evaluating the merits and difficulties of medical procedures. List the four principles, a medical practice must respect if it is to be considered "ethical" **04**

c) Is life with a disability not worth living? Give your arguments. **06**

OR

4 a) i. What is genetic testing? Reiterate any two methods used for genetic testing. **10**
ii. How is genetic testing done?
iii. What are the benefits of genetic testing?
iv. What is eugenics? What are the ethical concerns on eugenics?

b) A researcher in China by name He Jian Kui claims to have created the world's first gene-edited babies, but he didn't publish the results in an academic journal or provide other scientists with access to the babies. The little data he has revealed suggests that his efforts might not have worked - instead, his work may have put the babies' health at risk. The scientist allegedly used the gene-editing tool CRISPR cas-9 to disable the CCR5 gene in 31 embryos with the goal of making children who were more resistant to HIV. He claims that two of the embryos were implanted, resulting in the female babies "Lulu" and "Nana." The limited data provided by the scientist did reveal at a gene editing conference in Hong Kong this week suggests that the experiment did happen, but maybe not in the way that he intended. There are "all kinds of glitches," and the data shows that the babies weren't edited very precisely. The entire debacle shows why it is so important to have scientific and ethical safeguards. As being a biotechnologist, **10**

i. How you would handle this kind of research in the future?
ii. What are the ethical issues associated with this kind of research?

UNIT - IV

5 a) Many scientists consider germline editing to be unethical because you are deciding to permanently change not only one human's genetic makeup, but the genetic makeup of those after them, without their permission. Assess Pros and Cons of Designer Babies. **10**

b) i. What is personal genomics? **05**
ii. What are the ethical issues associated with personal genomics?

c) i. What Is IVF? **05**
ii. With the flow chart explain the IVF procedure.

OR

6 a) What are designer bodies? How do you develop the designer bodies using drugs? **10**

b) What are the differences between adult stem cells and embryonic stem cells? Why are human embryonic stem cells preferred over adult stem cells in research? **05**

c) What is cloning? Examine the types of artificial cloning? **05**

UNIT - V

7 a) Biological weapons possess unique characteristics that create ambiguity domestically and contradictions internationally. Unlike any weapon known to conflict or diplomacy, biological weapons can be masked by altruistic intentions and dual-use justification. Their proliferation under the guise of biodefense can be deemed peaceful and beneficial to society, but have the potential to cause a massive pandemic if mismanaged or acquired by the wrong group or government. They can be produced secretly and used without discernible or traceable origins mitigating political blowback and accountability. **10**

i. What are high-threat biological agents?
ii. How do you rank the various biological agents into categories?
iii. How easy would it be for a terrorist to launch a biological attack?
iv. What are the means of achieving protection against biological agents?
v. Is it necessary to have own supply of antibiotics in case of exposure to biological weapons?

b) What is biopiracy? Give an account on any three cases of biopiracy of traditional knowledge from India. **10**

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