Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Biotechnology **Semester: III**
Program: M.Sc. Microbiology, Clinical Research, Nutrition and Dietetics **Duration: 03 hrs.**
Course Code: HSMB8003, HSMB8004 **Max. Marks: 100**
Instructions:

	SECTION A **(Type the answers in test box)**	**(20Q x1.5M= 30 Marks)**	**CO**
Q1	Due to what food supply has increased during green revolution? (a) Use of chemicals (b) Use of biochemical (c) Use of phytochemicals (d) Use of agrochemicals	**1.5**	**CO1**
Q2	The genetically modified crops introduced in India are (a) Cotton (b) Mustard (c) Wild Plant (d) a & b	**1.5**	**CO1**
Q3	Biotechnology has contributed to the field of (a) Health (b) Pharmacy (c) Agriculture (d) All of the above	**1.5**	**CO1**
Q4	There is a restriction endonuclease called EcoRI. What does "co" part in it stand for? (a) coli (b) colon ? (c) coelom (d) coenzyme	**1.5**	**CO1**
Q5	Restriction enzymes were discovered by (a) Smith and Nathans (b) Alexander Fleming (c) Berg (d) None	**1.5**	**CO2**

Q6	Bacteria protect themselves from viruses by fragmenting viral DNA with (a) Ligase (b) Endonuclease (c) Exonuclease (d) Gyrase	**1.5**	**CO2**
Q7	Southern blotting is (a) Attachment of probes to DNA fragments (b) Transfer of DNA fragments from electrophoretic gel to a nitrocellulose sheet (c) Comparison of DNA fragments to two sources (d) Transfer of DNA fragments to electrophoretic gel from cellulose membrane	**1.5**	**CO2**
Q8	The Golden Rice variety is rich in (a) Vitamin C (b) B-carotene and ferritin (c) Biotin (d) Lysine	**1.5**	**CO2**
Q9	Transgenic plants are developed by (a) Introducing foreign genes (b) Introducing gene mutations (c) Deleting certain chromosomes parts (d) Stopping spindle formation	**1.5**	**CO3**
Q10	Cry genes or Bt genes are obtained from (a) Cotton pest (b) Tobacco plant (c) Bacillus thuringiensis (d) E – Coli	**1.5**	**CO3**
Q11	Which of the following is responsible for causing disease in plants (a) Virus (b) Pesticides (c) Herbicides (d) All of the above	**1.5**	**CO3**
Q12	The most common solidifying agent used in micropropagation is (a) agar b) dextran c) Mannan d) all of these	**1.5**	**CO3**
Q13	The culturing of cells in liquid agitated medium is called a) liquid culture	**1.5**	**CO4**

	b) micro propagation c) Agar culture d) suspension culture		
Q14	Hairy root cultures for secondary metabolite production are induced by transforming plant cells with a) virus b) Agrobacterium tumefaciens c) Bacillzus thuringiensis d) Agrobacterium rhizogenes	**1.5**	**CO4**
Q15	Haploid plants are produced in large numbers by (a) anther culture (b) Ovary culture (c) both a and b (d) embryo culture	**1.5**	**CO4**
Q16	A gene for insulin has been inserted into a vector for the purpose of obtaining its protein product only. Such a vector is called (a) expression vector (b) suppression vector (c) storage vector for genomic library (d) None of the above	**1.5**	**CO4**
Q17	Cells from kidney tissues cannot survive independently, it requires other surface for attachment and survival. a) True b) False	**1.5**	**CO5**
Q18	Which of the following is the characteristics of a normal cell? a) Anchorage independent b) Continuous cell lines c) Dependent on external growth factor d) No contact inhibition	**1.5**	**CO5**
Q19	The patents granted for biological entities and products derived from them are called _____ a) ethics b) patents c) bio-patents d) biosafety	**1.5**	**CO5**
Q20	Bioethics includes rules of conduct that may be used to regulate our activities concerning the biological world. It blends philosophy, theology, history, and law with the medical field. (a) True	**1.5**	**CO5**

	(b) False		
	SECTION B **(Scan and upload)**	**(4Qx5M=20 Marks)**	**CO**
Q1	What are major discoveries that led to the development of modern biotechnology?	**5**	**CO1**
Q2	Recombinant human insulin, produced by bacteria carrying a cloned insulin gene, is now the major form of insulin used to treat diabetes. The human insulin gene encodes an mRNA only 333 nucleotides long, but the entire gene spans more than 4000 nucleotides. There are three exons and two introns. If we were to clone this gene directly from the nuclear DNA, bacteria would not be able to express the insulin protein. Explain why this is true.	**5**	**CO2**
Q3	What is animal cell culture? Briefly describe culture conditions and types of animal cell culture.	**5**	**CO3**
Q4	List five most pressing ethical issues in biotechnology	**5**	**CO4**
	SECTION C **(Scan and upload)**	**(2Qx15M=30 Marks)**	**CO**
Q1	The FLAVR SAVR tomato is the first genetically engineered whole food to be sold in commerce following FDA approval on May 18, 1994 . FLAVR SAVR tomatoes (Lycopersicon esculentum Mill .) are defined as tomato cultivars or progeny of tomato lines genetically engineered using an antisense polygalacturonase gene isolated from tomato. These tomato cultivars were developed to improve flavor and taste in fresh market tomatoes . The polygalacturonase (PG) gene was isolated from tomato and reintroduced in the antisense orientation . PG is the major enzyme involved in pectin metabolism during fruit ripening and has historically been associated with fruit softening. The use of an antisense strategy to reduce the expression of the PG gene in tomatoes causes decreased pectin solublization in the ripening fruit which in fresh market tomatoes results in ripe fruit that remain intact for extended periods of time. In terms of a commercially viable product, the technology allows for the production of fresh market tomatoes which can be vine-ripened for enhanced flavor and have a longer shelf life yet still survive the traditional distribution system intact. Based on the above information, answer the following (a) Which technique (vector-mediated / vectorless) is used for transformation in developing Flavr Savr tomato? (b) How are Flavr Savr tomatoes genetically modified? (c) What is the advantage of Flavr Savr variety of tomato? Was the Flavr Savr tomato a success?	**15 (5 marks each)**	**CO3**

Q2	DNA technology is expected to revolutionize vaccine development in the future. DNA vaccines have only recently started the testing process, but are expected to eventually replace other methods of vaccine production. Conventional vaccines are made from either live, weakened pathogens (diseasecausing agents) or killed pathogens. Vaccines produced using live pathogens confer greater and longer lasting immunity than those using killed pathogens, but may carry some risk of causing the full-blown disease to develop. Applying individual proteins as antigens in sub-unit vaccines is made possible by recombinant DNA technology. DNA vaccines that are currently available to the global population include those for measles, mumps, rubella, seasonal influenza virus, tetanus, polio, Hepatitis B, cervical cancer, diphtheria, pertussis as well as several other diseases that are endemic to certain regions of the world. The disadvantages of DNA vaccines are based mainly on the activation of oncogenes as well as elicitation of anti-DNA antibodies and low immunogenicity in vaccines. Based on the above concept, answer the following: (a) How is DNA vaccine different from conventional vaccines (b) Comment on the effectiveness and safety of DNA vaccines (c) What are the disadvantages of DNA vaccines?	**15 (5 marks each)**	**CO4**
	SECTION- D **(Scan and upload)**	**(2Qx10M=20 Marks)**	**CO**
	Long Answer type Question		
Q1	(a) What is the role of *Agrobacterium tumefaciens* in plant transformation? (b) Discuss any three vector-less methods that can be used to introduce recombinant DNA into a competent host cell.	**10 (5 marks each)**	**CO3**
Q2	(a) What is genetic modification of crops and how is it done? Give two examples of GM crops that are being developed and introduced in India (b) How are GM crops regulated?	**10 (5 marks each)**	**CO5**