CBCS SCHEME

USN | | | | | | | | | | |

BBOC407

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2024
Biology for Engineers (CSE)

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Discuss the various components of Eukaryotic cells.	10	L3	CO1
	b.	Identify the applications of stem cells.	5	L2	CO1
	c.	Explain the functions of vitamins.	5	L2	CO1
		OR			
Q.2	a.	Compare Prokaryotic and Eukaryotic cells.	10	L3	CO1
	b.	Explain the properties of Carbohydrates.	5	L2	CO1
	c.	Explain the functions of Lipids.	5	L2	CO1
		Module – 2			
Q.3	a.	Highlighting the properties of cellulose, justify cellulose as an effective water filter.	10	L3	CO1
	b.	Explain the working and development of DNA vaccines by taking suitable example.	10	L2	CO1
		OR			
Q.4	a.	What are Bioplastics? Justify the use of PHA as Bioplastic mentioning its properties and applications.	10	L3	CO1
	b.	Discuss the following : (i) Meat analogs of protein. (ii) Lipids as cleaning agents.	10	L2	CO1
		Module – 3			
Q.5	a.	What is Electro Encephalogram (EEG)? Discuss the types of Brain activity detected with EEG. Write any three applications.	10	L3	CO2
	b.	What are Pace Makers? Explain basic design and construction of Pace Makers.	10	L2	CO2
		OR			
Q.6	a.	Justify Lungs as purification system.	10	L3	CO2
	b.	Explain architecture of Rod and Core cells with suitable diagram.	10	L2	CO2
		Module – 4			
Q.7	a.	What is ultrasonography? Explain the uses and working principle.	10	L2	CO3
	b.	What is lotus leaf effect? Explain the mechanism and applications of super Hydrophobic effect.	10	L2	CO3
		OR			
Q.8	a.	The structure and design of Kingfisher beak lead to the design of Bullet trains. Explain.	10	L2	CO3
	b.	Explain the working and applications of Bionic Leaf Technology.	10	L2	CO3

		Module – 5			
Q.9	a.	Explain the use of Electrical tongue in food science.	10	L2	CO4
	b.	Explain the advantages and limitations of Artificial Intelligence for disease diagnosis.	10	L2	CO4
		OR			
Q.10	a.	Explain Bioengineering solutions for muscular dystrophy and Osteroporosis.	10	L2	CO4
	b.	Explain most commonly used Bioprinting Techniques.	10	L2	CO4

* * * * *

Visvesvaraya Technological University

Belagavi, Karnataka - 590 018.

Scheme & Solutions Signature of Scrutinizer

Subject Title : BIOLOGY FOR ENGINEERS **Subject Code :** BBOC407

Question Number	Solution	Marks Allocated
1. a)	components of Eukaryotic cells Cell membrane, cytoplasm, organelles, Nucleus, Nucleolus, Mitochondria, Ribosome, Endoplasmic Reticulum, Golgi Bodies, Vacuole, Vesicles etc. Explanation of any 10, 1 mark each.	10x1=10
b)	Applications of Stem cells - 1) HSC Transplantation 2) Placental Stem therapy. 3) Artificial organ Engineering. 4) Anti-aging effects 5) Wound healing Explanation of any five applications	5
c)	Functions of Vitamins - Vitamin A - Vision, Skin health Vitamin B - RBC formation, Nerve function Vitamin C - Boosts Immune system, antioxidant Vitamin D - Bone health, calcium absorption Vitanin E - Protecting cells from damage Vitamin K - Blood clotting, Bone health etc. Any 5 - 1 marks each	5

Subject Title : Biology For Engineers. Subject Code : BBOC407

Question Number	Solution	Marks Allocated
2) a)	comparision -	
	Parameter / Prokaryotic / Eukaryotic	
	Nucleus / Absent / Present	
	cell size / smaller / larger	
	cell structure / Unicellular / Most Multicellular	
	complexity / Simpler / complex	
	DNA / circular / linear	1x10
	Mitochondria / Absent / present	
	Golgi Apparatus / Ab / present	
	Reproduction / Asexual / Sexual	
	cell wall / Present / absent	
	Example / Bacteria / Fungi, animal, Plant	
b)	Properties -	
	Physical - Stereoisomerism, optical activity, Annomerism	
	Chemical - Osazone formation, oxidation, Reduction to alcohol.	5
c)	Functions of Lipids	
	Energy storage, Insulation, cell membrane structure, Harmone synthesis, Transport with explanation (1 mark each)	1x5
3) a)	Properties - High Porosity, Biodegradibility, cost effective, Good Mechanical strength, Chemical Resistance	05
	Explanation & working	05
b)	DNA vaccine - is a type of vaccine that uses a piece of viral or bacterial DNA to simulate an immune response against Pathogen	02

Subject Title : BIOLOGY FOR ENGINEERS Subject Code : BBOC407

Question Number	Solution	Marks Allocated
	Working -	3.
	DNA Vaccine for Rabies, Importance -	5
4) a)	Bio plastics - Biodegradable and Biocompatible	02
	Properties of PHA -	04
	Applications -	04
	b)(i) Meat analogs & Protien	
	- Meat analogs - meat substitutes are plant based foods designed to mimic the taste, texture and appearance of meat.	02
	Explanations with examples - Tofu, Temph, Seitan, Veggie Burgers, Plant based Sausage.	03
	(ii) Lipids as leaning agents -	
	Explanation with examples -	03.
	Advantages and limitations (2 each)	02
5) a)	EEG - Non invasive method for measuring and recording of the electrical activity of the brain.	02.
	Types & Brain activity - Delta waves (0.5-4 Hz) Theta wave (4-8 Hz), Alpha wave (8-12 Hz) Beta wave (12-30 Hz), Gamma wave (30-100 Hz) with explanation.	05
	Any 3 applications -	03.
5) b)	A pacemaker is a small device that surgically implanted in the chest to regulate the heart beat.	02
	Types - Design with explanation, construction	04 04

Subject Title : BIOLOGY FOR ENGINEERS. Subject Code : BBOC407

Question Number	Solution	Marks Allocated
6) a)	The lung purifies air by removing harmful substances and adding oxygen to the blood stream,	02.
	process - Filtration, Moisterization, Gas Exchag with explanation	03 05
b)	Rod cells - are photoreceptor cells in the retina of the eye that are responsible for detecting light and transmitting signals to the brain for perception of vision especially in low light condition	02
	Explanation with diagram	03.
	Cone cells - photoreceptor cells in the retina that are responsible for color vision and visual acuity.	02
	Explnation with diagram	03.
7) a)	Ultrasonography is a Medical imaging technique that uses high freq. sound waves to produce images of the internal organs and tissues of the body.	02
	Uses - Gynecology, Abdominal Imaging, Musculoskeletal Imaging, Vascular Imaging, Eye and Neck Imaging, Emergency medicine.	04.
	working	04.
b)	The ability of lotus leaves to repel water and self clean through their unique surface structure.	02
	Mechanism of Super Hydrophobic Effect	04.
	Applications - Electronics Industry Automobile Ind, Aerospace Industry, with explanation,	04

Subject Title : BIOLOGY FOR ENGINEERS

Subject Code : BBOC407

Question Number	Solution	Marks Allocated
8) a)	Physics behind kingfisher - Beak streamlining, Surface Tension, Minimizing splash with explanation	05
	Technological Importance with explanation	05
b)	Bionic leaf - which aims to mimic the process of photosynthesis in plants. consists of photovoltaic cell - captures sunlight and convert it in to electrical energy -	05
	Applications - Renewable Energy production, CO_2 Reduction, Agriculture and food production, etc. with explanation (any 5)	05
9) a)	Electrical tongue is a used to analyze the taste and flavor of food and beverage.	02
	Technology and working	04
	Advantages - Non Invasive, High throughput, objective analysis, cost effective.	04
b)	Advantage - Image analysis, Data analysis, Diagnosis, Medicine, clinical decision support with explanation	05
	Limitation - any 5 with explanation	05
10) a)	Bio Engineering soln for muscular dystrophy any 5 - Gene Therapy, Stem cell therapy, Tissue engineering, Exoskeleton technology	05
	Bio Engineering solns for osteoporosis Tissue Eng, Stem cell therapy, biomaterials, Gene therapy	05
b)	Bioprinting - working explanation	05
	Advantages & limitation.	05