Register Number:……..

KUMARAGURU
college of technology
character is life

B.E DEGREE EXAMINATIONS: NOV/DEC 2022

(Regulation 2018)

Third Semester

Electronics and Instrumentation Engineering

U18BTT3006 : Biology For Engineers

COURSE OUTCOMES

CO1: Understand the basics of evolution.

CO2: Learn the composition of cells and information storage and transfer in cells.

CO3: Obtaining an overview on the various biological systems and engineering problems

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match the type of organelle (list I) and their function (List II) CO2 [K_1]

List I	List II
A. Endoplasmic Reticulum	i. ATP (energy) production
B. Mitochondria	ii. Photosynthesis
C. Chloroplast	iii. Degradation
D. Lysosome	iv. Protein synthesis

	A	B	C	D
a)	vi	i	ii	iii
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	ii	iii	i	iv

2. Which one of the following widely accepted theory of origin of life on earth? CO1 [K_2]
   a) Theory of special creation b) Spontaneous theory
   c) Theory of catastrophism d) Theory of chemical evolution

3. Which of the following is an CORRECT statement with respect to Oparin-Haldane hypothesis on living organisms? CO1 [K_2]
   i. Cells are capable of reproducing from preexisting cells
   ii. Hereditary information is passed to the new cells
   iii. Cells are NOT surrounded by cell membrane
   iv. Cells uses energy for growth and reproduction
   a) i&iv b) ii&ii
   c) i,ii and iv d) i&iv

4. Which one of the following is a third stage of antigen- antibody reaction? CO2 [K_1]
   a) Agglutination b) Precipitation
   c) Opsonization d) Neutralization

5. Assertion (A): Wearable electronic devices help patients and disease management using artificial intelligence (AI). CO3 [K_3]
   Reason (R): Current use of wearable electronics for healthcare applications is limited because of concern over data security and high cost.
   a) Both A and R are Individually true and R is the correct explanation of A
   b) Both A and R are Individually true but R is not the correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

6. Identify the function of ATPase in a cell. CO3 [K_1]

a) Decomposition of ATP b) Modification of ATP

c) Synthesis of ATP d) Storage of ATP

7. Below are the sequence of events in a mitotic cell division. CO2 [K_1]

i. Anaphase
i. Interphase
ii. Prophase
iii. Cytokinesis
iv. Telophase
v. Metaphase

Arrange them correct order.

a) i-iii-vi-ii-v-iv b) ii-iii-vi-i-v-iv

c) ii-iii-vi-i-v-iv d) ii-i-vi-iii-v-iv

8. Which one of the following macromolecular protein is present in cartilages and ligaments? CO3 [K_2]

a) ATP synthase b) Albumin

c) Collagen d) Globulin

9. Assertion (A): Ceramic implants are better alternative to metallic implants like Titanium oxide for teeth. CO3 [K_3]

Reason (R): Ceramic implants are more stronger and durable.

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

10. Choose correct methodology used for monoclonal antibody production. CO3 [K_1]

a) Antisense technology b) Antibody technology

c) Hybridoma technology d) Clonal hybridization

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

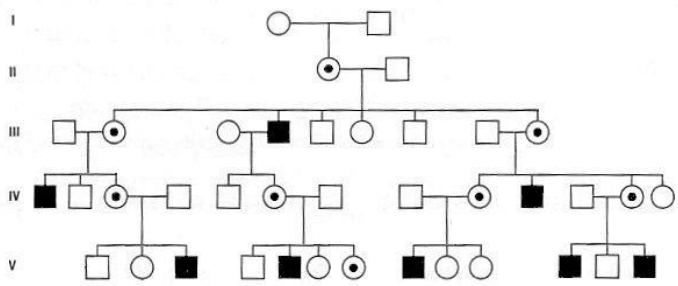
11. What are the "unique" features of earth that help living organisms to survive. CO1 [K_2]

12. Classify living organisms based on tree of evolution. CO1 [K_2]

13. Below is the commonly used instrument for biomolecule separation. Identify the type of instrument and provide brief note on its application in biomolecule separation. CO2 [K_3]

14. What is radioactive dosage? How is it monitored? CO3 [K_3]

15. Infer the type of inheritance pattern from the image given below. CO2 [K_4]



16. Classify immune system of human being. CO3 [K_1]

17. Draw and lable the essential units of a sophisticated hydroponic system. List any FOUR plant that can be grown in hydroponics. CO2 [K_2]

18. "Proteins are called as workhorse of cells". Substantiate this statement with CO2 [K_2]

19. Anemia is a condition in which you lack enough healthy red blood cells to carry adequate oxygen to your body's tissues. A person feeling weak and gone for a blood test. Below is his/her blood test report. Comment on the report with respect your learning on human physiology related to this situation. CO3 [K_4]

Test	Patient's results	Reference value
INR	1	0.8-1.25
aPTT (s)	29,9 s	24-36 s
Platelet count (no./mmc)	285.000	150.000-400.000
Erythrocyte count (cells/mmc)	2.8	3.8-5.2
Hemoglobin (g/dL)	7.5	12.0-16.0

20. Comment on three important components of a typical tissue engineering set up. CO3 [K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 350 words)

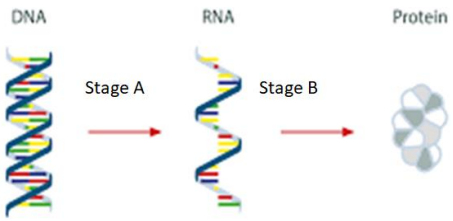
21. a) Question of origin of life is multifaceted and many theories were formulated to explain the appearance of life on earth. List out any FOUR theories and which one is finally accepted and support it with suitable experimental set-up. 7 CO1 [K_2]

    b) Darwin observed tremendous change in diversity in living organisms and proposed theory of evolution by natural selection. Substantiate this statement with suitable examples. 7 CO1 [K_3]

22. a) Positron Emission Tomography (PET) with radioactive isotopes is used for cancer disease. Summarize commonly used radioactive isotopes for various diseases with respect to their properties. 7 CO2 [K_3]

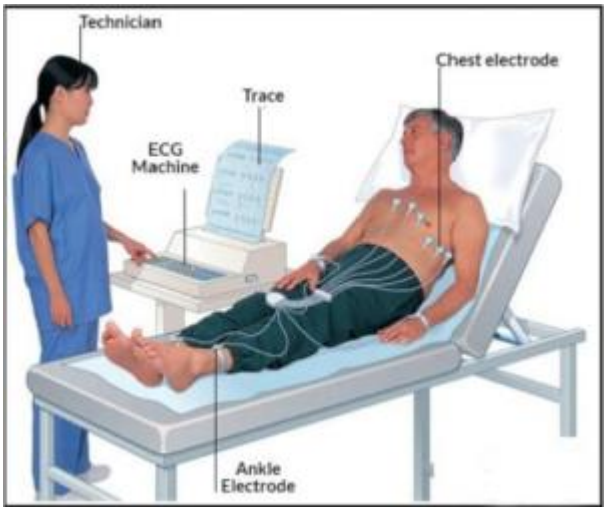
    b) Explain principle and steps in usage of chromatographic techniques for separation of biomolecules with relevant illustrations. 7 CO2 [K_2]

23. a) Elaborate of various stages of cell mitotic cell division with suitable diagram. How is flow cytometry based cell sorting help to identify normal cells and cancerous cells?. 7 CO2 [K_3]



    b) Above is the flow of information in a typical living cell. Identify the stage marked 7 CO2 [K_3]

as A and stages B and explain the essential features.

24.	a)	Describe anatomy and functions of heart and what are risk factors associated with heart diseases Below is the image of a person undergoing diagnostic test. Identify the and relate with organ for which it is done.  	7	CO3	[K_4]
	b)	Below are the symptoms presented by a patient in a hospital. • A persistent cough that produces thick mucus (sputum) • Wheezing. • Exercise intolerance. • Repeated lung infections. • Inflamed nasal passages or a stuffy nose. • Recurrent sinusitis Based on your learning on various physiological organs and systems, find out the suitable the organ which is affected. What are the diagnostic tests and treatments available for this disease	7	CO3	[K_5]
25.	a)	Monoclonal antibody are the advanced type of drugs. How are monoclonal antibodies produced using hybridoma technology?.	7	CO3	[K_2]
	b)	RNAi (RNA interference) is a means to control gene expression. In a diagnostic study, it was found that "gene XXXX" is over expressed which results in malfunctioning of a metabolic pathway. Design an experimental protocol with RNAi to develop appropriate treatment strategies.	7	CO3	[K_4]
26.	a)	Draw a neat block diagram of a glucose biosensor and describe its parts. Below are the types of biosensor which one of the following will be useful for detecting an analyte if the analyte is capable of absorbing UV light. i. Electrochemical biosensor ii. Thermal biosensor iii. Optical biosensor	7	CO3	[K_3]
	b)	Describe design elements present in a lab-on chip citing blood sample analyser as example.	7	CO3	[K_2]

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