Register Number:……..

KUMARAGURU
college of technology
character is life

B.TECH DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fourth Semester

BIOTECHNOLOGY

U15BTT404 : Cell and Molecular Biology

COURSE OUTCOMES

CO1: Recognize the fundamental concepts in the cell structure and function and membrane transport processes.
CO2: Comprehend the diversified roles of cytoskeletal filaments, the cascade of events in signal transduction
CO3: Discuss and distinguish the replication of prokaryotic and eukaryotic DNA
CO4: Describe the synthesis of RNA and post-transcriptional modifications.
CO5: Relate genetic code and protein synthesis
CO6: Evaluate gene regulation, DNA damage and repair mechanisms

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match the following enzymes with their corresponding roles in DNA replication: CO3 [K_1]

List I	List II
A. Topoisomersase	i. Synthesizes primer
B. Primase	ii. Removes RNA primer and replaces with DNA nucleotides
C. Helicase	iii. Alleviates supercoiling
D. DNA polymerase	iv. Breaks hydrogen bonds between two strands

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

2. Which of the following receptor is example of an ion channel? CO1 [K_2]

a) Acetyl choline receptor b) EGF receptor
c) Corticosteroid receptor d) Growth hormone receptor

3. Which of following statements about eukaryotic RNA polymerase are correct? CO4 [K_4]

1. RNA polymerase III is responsible for the synthesis of rRNA molecules.
2. The promoter sequences for RNA polymerases, I and III are same.
3. RNA polymerase is isolated and obtained from mammalian cells.
4. The subunit compositions of different RNA polymerases are different.

a) 1,3 b) 2,4

c) 1,2 d) 1,4

4. The ____ surrounds the cell like a belt, preventing the passage of substances between the cells. CO2 [K_2]

a) gap junction b) desmosome

c) hemi desmosome d) tight junction

5. **Assertion (A):** Coupled transcription-translation does not occur in eukaryotes. CO5 [K4]

Reason (R): mRNA is synthesized and processed in the nucleus and later transported through the nuclear membrane to the cytoplasm, where the ribosomes are located.

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. An organelle composed of a stack of flattened saccules may function to CO1 [K_2]

a) propel the cell b) replicate DNA

c) produce glucose d) package proteins

7. Choose the correct signal transduction pathway: CO2 [K_2]

(1) Hormone → 7 TM receptor → G protein → cAMP → PKA

(2) Hormone → G protein → 7 TM receptor → cAMP → PKA

(3) Hormone → 7 TM receptor → G protein → PKA → cAMP

(4) Hormone → 7 TM receptor → cAMP → G protein → PKA

a) 2-3-4-1 b) 1-2-3-4

c) 3-4-2-1 d) 4-1-3-2

8. The feature distinguishing DNA polymerase I from RNA polymerase in E.coli is the CO3 [K_4]

a) Direction of chain elongation b) Need for a primer

c) Need for a template d) Bidirectional activity

9. **Assertion (A):** cAMP-CRP complex is a positive regulator of lac operon. CO6 [K_4]

Reason (R): The cAMP- CRP complex binds to a specific base sequence in the promoter region in order for transcription to occur.

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. Which of the following is an example of base analogue mutagen? CO6 [K_1]

a) 5-bromouracil
b) Acridine orange
c) Ethidium bromide
d) EMS

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Why golgi complex is called “traffic police of the cell”? CO1 [K_2]
12. How do carrier proteins differ from channel proteins in function? CO1 [K_4]
13. What is cadherin? CO2 [K_4]
14. What are secondary messenger? CO2 [K_2]
15. Give reasons why eukaryotic replication is more complex than prokaryotes? CO3 [K_5]
16. Mention the unique characteristics of extra chromosomal DNA which make them to consider as cloning vectors? CO3 [K_2]
17. Bring out the essential differences between transcription and replication processes. CO4 [K_4]
18. Which processes in protein synthesis require hydrolysis of GTP? CO5 [K_2]
19. What is the consequence of repressor action in lac operon model? CO6 [K_2]
20. Why is DNA repair mechanism essential for mammalian cells? CO6 [K_4]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Many regulatory mechanisms are used in bacteria which depend upon on/off switch systems. Justify the statement with an operon model as an example. CO6 [K_5]

22. Discuss the structure of plasma membrane along with its composition and functions. Add a note on fluid mosaic model. CO1 [K_2]

23.	Analyze the role of receptors and second messengers in signal transduction cascade.	CO2	[K_4]
24.	Describe the process of replication in eukaryotes. Add a note on replication of telomeres in eukaryotes.	CO3	[K_3]
25.	Post transcriptional processing is essential for generation of mature mRNA molecule in eukaryotes. Justify.	CO4	[K_5]
26.	Explain the mechanism of chain initiation and elongation of protein synthesis in prokaryotes.	CO5	[K_2]
27.	Illustrate the different types of chemical mutagens and their mechanism of action in mutagenesis.	CO6	[K_3]

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