Exam Date & Time: 23-May-2022 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

Cell and Molecular Biology [PBT-BP808ET]

Marks: 75 **Duration: 180 mins.**

I Multiple Choice Questions (MCQs)

Answer all the questions. Section Duration: 30 mins

1) The credit of discovery of Codon as a code word for one amino acid goes to-------.

1)	François Jacob and Sydney Brenner		2)	Matthew Meselson and Franklin Stahl.		3)	Rosalind Franklin and Maurice Wilkins		4)	Gobind Khorana and Marshall Nirenberg.		(1)

2) Infolds of plasma membrane is known as---

1)	Mesosome		2)	Metaplasm		3)	Cytoskeleton		4)	Lamella		(1)

3) Which of the following structures are absent in eukaryotic cells?

1)	Cell wall		2)	70s Ribosomes		3)	Nucleolus		4)	Histones		(1)

4) The membrane protein that extend through both sides of the lipid bilayer

1)	Acidic protein		2)	Glycoprotein		3)	Intrinsic protein		4)	Glycolic acid		(1)

5) Which among the following statements is true with respect to meiosis

1)	Chiasmata form temporarily where crossing over occurs.		2)	No synaptonemal complex forms between chromosomes.		3)	Telophase-I is eliminated in some cases.		4)	The second meiotic division is generally not preceded by an interphase.		(1)

6) Chromosomes reach equator during cell division at

1)	Prophase		2)	Metaphase		3)	Telophase		4)	Anaphase		(1)

7) The energy required to break a single C-O bond is

1)	18 kcal/mol		2)	84 kcal/mol		3)	170 kcal/mol		4)	5 kcal/mol	

(1)

8) Cyclins contain a "destruction box" near their amino terminus in the sequence, the which targets them for ----------

1)	Nucleus		2)	Mitochondria		3)	Proteosome		4)	Vacuoles	

(1)

9) For a typical animal cell, Vm is ----------

1)	-50 to -60 mV		2)	-60 to -70 mV.		3)	-70 to -80 mV		4)	-80 to -90 mV	

(1)

10) Which of the following is a nuclear receptor?

1)	Gated-ion channel		2)	Receptor enzyme		3)	Serpentine receptor		4)	Steroid receptor	

(1)

11) The noncoding DNA can represent about ----------% of the genome in eukaryotes.

1)	50		2)	75		3)	98		4)	100	

(1)

12) RNA is involved in a wide range of cellular processes, identify the type of RNA involved in pre-mRNA splicing.

1)	rRNA		2)	tRNA		3)	snRNA		4)	snoRNA	

(1)

13) Which of the following DNA-dependent RNA polymerase is required in the transcription of rRNA genes?

1)	RNA polymerase I		2)	RNA polymerase II		3)	RNA polymerase III		4)	RNA polymerase IV	

(1)

14) The σ factor is primarily involved in the recognition of gene promoters. Which of the following sigma factor is involved in inducing heat shock proteins?

1)	σ70		2)	σ32		3)	σE		4)	σS	

(1)

15) Following factors can determine the success of transgenic animal by pronuclear injection, except---

1)	Site of transgene insertion		2)	Copy number		3)	Stability of the transgene		4)	The LTR	

(1)

16) In transgenic technology using pronuclear injection, the foster mothers can be made pseudopregnant by

1)	Injection of pregnant mares serum		2)	coupulation with sterile male		3)	Injection of Human chorionic gonadotropin		4)	None of these	

(1)

17) Chemical Method of DNA sequencing was developed by

1)	Allan Maxam and Walter Gilbert		2)	Frederick Sanger		3)	Herbert Pohl		4)	Margaret Fahnestock		(1)

18) The largest subunit of RNA Pol II consists of a long -carboxy-terminal tail containing main repeats of a consensus ----------heptad amino acid sequence. (1)

1)	YPSTPSP		2)	YSPTSPS		3)	SPYSPYS		4)	SPTSPTY		

19) Identify the protein factor required to prevent premature binding of tRNAs to the ribosome at site A during the initiation of translation in bacterial cells. (1)

1)	IF-1		2)	IF-2		3)	IF-3		4)	IF-4		

20) Two amino acid molecules can be covalently joined through a substituted amide linkage, termed a peptide bond, to yield a ---------- (1)

1)	Monopeptide		2)	Dipeptide		3)	Tripeptide		4)	None		

II Long Answers

Answer all the questions.

1) Describe the cell cycle in mammalian cells. How the cellcycle is regulated. Write briefly on the various checkpoints and their significance. (10)

2) Briefly explain the following terms related to protein synthesis
Crick's adapter hypothesis (2 m)
Nonoverlapping vs Overlapping code (2 m)
Reading frame (2 m)
Degeneracy of genetic code (2 m)Wobble base (2 m) (10)

III Short Answers

Answer all the questions.

1) Explain the DNA sequencing using Sanger's method (5)

2) Explain the detection of homologus recombination using PCR. (5)

3) Explain the Ramachandran plot of protein structure. (5)

4) Write a note on the isoelectric focusing technique to separate proteins. (5)

5) Write a brief note on transcriptional attenuation in the trp operon. (5)

6) Describe key features of the molecular mechanism of signal transduction with a diagram. (5)

7) Explain how the binding of insulin-to-insulin receptor inactivates GSK3 to promote the synthesis of glycogen. (5)

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