

Instructions:

**All Questions are compulsory
Draw neat and labeled diagram
wherever necessary**

- Q-1 Write the following 14**
- (i) What is a tumor suppressor gene? Explain it using the example of Rb gene. 7
- (ii) How is growth and proliferation of cells affected by the alteration in PI3K/AKT pathway? 7
- OR**
- (i) Write an overview of oncogenes that encode growth factors and their receptors, including their roles in cancer development. 7
- (ii) Explain the extrinsic apoptotic pathway. 7
- Q-2 Write the following 14**
- (i) Write an overview of oncogenes that encode growth factors and their receptors, including their roles in cancer development. 7
- (ii) What is necroptosis? Describe the signaling pathway responsible for necroptosis. 7
- OR**
- (i) Provide a brief overview of signal transduction. 7
- (ii) Write a note on 'Apoptosis and its role in cancer'. 7
- Q-3 Write the following 14**
- (i) Write a note on alternative lengthening of telomeres. 7
- (ii) How does DNA damage occur? 7
- OR**
- (i) Explain different approaches of killing cancer cells with respect to telomerase. 7
- (ii) What is microsatellite instability and its consequences? How it is repaired? 7

(P.T.O)

- Q-4 Write the following** **14**
- (i) How chromosomes are protected? Write briefly about the genes involved in chromosome protections with respect to telomerase. 7
- (ii) How does homologous recombination function, and what happens if it is left unrepaired? 7

OR

- (i) Write notes on (1) End replication problem (2) Epigenetics of hTERT gene 7
- (ii) How are telomeres linked to genome instability and cancer? 7

Q-5 Multiple Choice Questions (Any seven out of twelve). **14**

- 1 _____ split the signal and route them to multiple outputs.**
- a Node b Junction
c Second messenger d Receptor
- 2 Receptors for growth hormone are found on _____.**
- a Cell surface b Nucleus
c Cytoplasm d Mitochondria
- 3 Which of the following enzyme involved in initiation of signaling pathway?**
- a Phosphatase b Kinase
c Ligase d Dehydrogenase
- 4 CDK4 and CDK6 in association with D type Cyclins are important in _____.**
- a Progression during G1 cell cycle phase b Transition from G1 to S phase
c Progression of cells through mitosis d Progression during S and G2 phase
- 5 Chromosomes split and the sister chromatids move to opposite poles of the cell during _____.**
- a Telophase b Anaphase
c Metaphase d Prophase
- 6 The condition or process of deterioration of cell with age is called _____.**
- a Necrosis b Autophagy
c Senescence d Necroptosis
- 7 Mammalian telomeres are mainly associated with _____.**
- a Shelterin complex b MRN complex
c SMC5-SMC6 complex d CORE complex
- 8 _____ is the major mechanism of telomerase regulation in human cells.**
- a Transcriptional regulation of hTR b Transcriptional regulation of hTERT
c Transcriptional regulation of hTP d Transcriptional regulation of hTP and hTERT

- 9 _____ gene is located on chromosome 5.
- | | | | |
|---|------|---|-------|
| a | hTR | b | hTERT |
| c | TRF1 | d | hTP |
- 10 _____ is a marker for cellular senescence.
- | | | | |
|---|-------|---|-----------|
| a | Ki-67 | b | Caspase-3 |
| c | P53 | d | SA-B-Gal |
- 11 _____ mutation is found in smokers lung cancer.
- | | | | |
|---|------|---|-------|
| a | EGFR | b | K-Ras |
| c | JAK2 | d | B-Raf |
- 12 _____ received Nobel Prize in Physiology or Medicine for the discovery of miRNA and its role in post-transcriptional gene regulation.
- | | | | |
|---|----------------------------------|---|-------------------------------|
| a | Katalin Kariko and Drew Weissman | b | Victor Ruvkun and Gary Ambros |
| c | Katalin Weissman and Drew Kariko | d | Victor Ambros and Gary Ruvkun |
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