Q. Code:851612

Reg. No. | | | | | | | | | | | | | |

M.E / M.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

BY22016 – ADVANCED CANCER BIOLOGY AND THERAPY

(Biotechnology)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Identify the role of genetics and immune system in cancer.	**4**
CO 2	Explain tumorigenesis and interactions of immune cells with cancer.	**2**
CO 3	Evaluate role of tumor suppressor gene and tolerance machinery.	**5**
CO 4	Analyze the failures of different mechanism leading to un repairable DNA damage.	**4**
CO 5	Create medical applications using immune cells against cancer.	**3**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Explain the concept of oncogene activation in carcinogenesis and provide an example.	**1**	**3**
2.	How the discovery of oncogenes has advanced our understanding of oncogenesis?	**1**	**3**
3.	Discuss the significance of genetic abnormalities in tumor cells and their implications for cancer progression and treatment.	**1**	**3**
4.	Evaluate the role of growth factors and receptors in carcinogenesis.	**1**	**4**
5.	What is the significance of understanding cancer cell death strategies induced by immune cells in cancer therapy?	**2**	**2**
6.	Define cancer stem cells and discuss their significance in cancer initiation.	**2**	**2**
7.	What role do telomeres play in tumorigenesis?	**2**	**2**
8.	Define cellular senescence in aging and tumor suppression.	**2**	**2**
9.	How do mutations in tumor suppressor genes impact the regulation of cell proliferation and apoptosis?	**3**	**4**

10.	Analyze the relationship between immune surveillance and cancer.	**3**	**4**
11.	Discuss the role of familial cancer syndromes in understanding tumor suppressor genes.	**3**	**4**
12.	How can deregulations in self-tolerance machinery correlate with the risk of autoimmune disorders and cancer?	**3**	**4**
13.	How do deficiencies in DNA repair mechanisms increase susceptibility to carcinogenesis?	**4**	**3**
14.	How does cancer cell metabolism differ from that of normal cells, and what implications does this have for cancer treatment?	**4**	**3**
15.	What role does angiogenesis play in tumor growth and progression?	**4**	**3**
16.	How do DNA repair mechanisms maintain genomic integrity, and what are the consequences of their dysfunction?	**4**	**3**
17.	What role do cytokines play as biological response modifiers in cancer treatment, and how are they used clinically?	**5**	**3**
18.	How do new genomic and proteomic technologies contribute to personalized cancer treatment approaches?	**5**	**3**
19.	How do traditional chemotherapeutics work to treat cancer, and what are some common side effects associated with their use?	**5**	**3**
20.	How do targeted therapies differ from traditional chemotherapy in terms of their mechanism of action and side effect profiles?	**5**	**3**

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Discuss the intricate relationship between mutagens, carcinogens, and mutations in the development of cancer. Provide examples of common mutagens and carcinogens, elucidate their mechanisms of action.	**(10)**	**1**	**3**
	(OR)			
(b)	Discuss how immune surveillance mechanisms recognize and eliminate cancer cells, as well as how tumors evade immune detection through immune suppression and tolerance mechanisms.	**(10)**	**1**	**3**
22. (a)	Explain the concept of cellular senescence and its role in preventing	**(10)**	**2**	**2**

tumorigenesis. Discuss how cellular senescence limits the proliferation of aging cells and its significance in cancer prevention.

(OR)

(b)	Explain how immune cell types detect and process cancer cells through major histocompatibility complex (MHC) molecules. Discuss the role of MHC in presenting tumor antigens to immune cells, triggering an immune response against cancer cells.	**(10)**	**2**	**2**

23. (a)	Analyze the significance of familial cancer syndromes in uncovering tumor suppressor genes and elucidating their role in cancer susceptibility.	**(10)**	**3**	**4**

(OR)

(b)	Evaluate the role of the p53 tumor suppressor in apoptosis and its impact on cancer susceptibility. Discuss how mutations in the p53 gene disrupt apoptotic pathways, leading to unchecked cell proliferation and increased cancer risk.	**(10)**	**3**	**4**

24. (a)	Evaluate the impact of environmental factors on DNA damage and repair mechanisms. Discuss how exposure to carcinogens, ultraviolet radiation, and other environmental stressors can induce DNA damage, potentially leading to the development of cancer	**(10)**	**4**	**4**

(OR)

(b)	Critically analyze the therapeutic strategies targeting angiogenesis in cancer treatment. Compare and contrast anti-angiogenic therapies with conventional cytotoxic treatments, considering their efficacy, side effects, and potential resistance mechanisms.	**(10)**	**4**	**4**

(OR)

25. (a)	Explore the applications of new technologies in cancer prevention, risk assessment, diagnostics, and treatment decision-making. Discuss how advances in technology, such as liquid biopsy and next-generation sequencing, contribute to early detection, prognostication, and treatment selection in cancer care.	**(10)**	**5**	**3**

(OR)

(b)	Discuss the principles of cell-based therapy against cancer, focusing on	**(10)**	**5**	**3**

approaches such as chimeric antigen receptor (CAR) T-cell therapy and tumor-infiltrating lymphocyte (TIL) therapy. Explain the clinical outcomes and challenges associated with these innovative treatment modalities.

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Investigate the correlation between deregulations in self-tolerance machinery and immune surveillance as risk factors for autoimmune disorders and cancer in the context of tumor suppressor gene failure. Discuss how defects in immune tolerance mechanisms may predispose individuals to autoimmune diseases and increase susceptibility to cancer development.	**(10)**	**3**	**5**

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