P. P. Code: 64538

(1)

BIOTECHNOLOGY PAPER-II

Q. 1	Do as directed: (any fifteen)	15 M
1)	Holoenzyme-Inactive /Precursor Enzyme	
2)	Oxido-reductase	
3)	b. Decreases	
4)	Temperature coefficient- is defined as increase in enzyme velocity when temperature is increased by $10^{o}C$.	
5)	Explain the term: Homotropic effect- Is used if the substrate influences the substrate binding through allosteric mechanism, their effect is always positive.	
6)	Idoacetate, Diisopropyl fluorophosphates (DFP), Disulfirm, Penicillin.	
7)	a. Proteins	
8)	Zymogen-inactivated enzyme	
9)	a. B cell	
10)	b. Cell Mediated Immunity	
11)	a. Tears	
12)	a. Live attenuated vaccine	
13)	b. Lymph node	
14)	b. Incomplete antibodies	
15)	Variance	
16)	Range is the value (maximum value – minimum value in the data).	
17)	Data is a collection of observations expressed in numerical figures.	
18)	It is range or length of a class interval or difference between the upper and lower-class boundaries.	
19)	The difference or deviation between the value of a statistic of a particular sample and the corresponding population parameter is known as standard error.	
20)	Measures of central tendency	
Q.2 A	Describe classification of enzymes with example.	8M

First EC digit	Enzyme class	Reaction type
1.	Oxidoreductases	Oxidation/reduction
2.	Transferases	Atom/group transfer (excluding other classes)
3.	Hydrolases	Hydrolysis
4.	Lyases	Group removal (excluding 3.)
5.	Isomerases	Isomerization
6.	Ligases	Joining of molecules linked to the breakage of a pyrophosphate bond

Give one example of each class.

(2)

<table>
<tr><td>Q.2 B</td><td>Give an account of the various factors affecting enzyme activity.
1.Concentration of enzyme
2. concentration of substrate
3. pH
4. Temperature
5. Product concentration
6. Activator
7.time
Any 3 factors</td><td>7M</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>Q.2 C</td><td>Explain mechanism of enzyme action.
Effect of enzyme on activation energy and any one model (Lock-key , induced fit theory and Substrate strain theory)</td><td>8M</td></tr>
<tr><td>Q.2 D</td><td>With example explain competitive inhibition.
Definition, Mechanism- diagrammatic explanation, effect of competitive inhibitor on Km and Vmax value and one example.</td><td>7M</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Q.3 A</td><td>Explain any two mechanisms of Innate Immunity.
Respiratory tract; skin and mucosal linings; digestive tract; conjunctiva; urine</td><td>8M</td></tr>
<tr><td>Q.3 B</td><td>Explain the structure of an antibody molecule with a neat labelled diagram.
Dimer – 2H and 2L chains, Fab, Fc, hinge, CDRs, disulphide bonds</td><td>7M</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>Q.3 C</td><td>Explain with a diagram the structure of IgA.
Secretory IgA is a dimer, 2H and 2L chains, disulphide bonds, Fab and Fc region, CDRs, J chain</td><td>8M</td></tr>
<tr><td>Q.3 D</td><td>Describe Hybridoma technology.
Fuse mouse myeloma cell and B cell to produce hybridoma and grow on HAT medium. Explain role of aminopterin, H and T, and myeloma cells are HGPRT –ve.</td><td>7M</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Q.4 A</td><td>Define – Biostatistics. Discuss the importance of biostatistics in biology.
Biostatistics is a field of science that uses quantitative methods to study life sciences related problems that arise in a broad array of fields. Biostatistics provides stochastic models and methods, algorithms and graphical tools for the analysis of data. Biostatistics is application of principles of statistics to the problems of biology. – 2 Marks; any six applications can be discussed – 6 Marks</td><td>8M</td></tr>
<tr><td>Q.4 B</td><td>Explain median and compute for the following data:
<table>
<tr><td></td><td>100</td><td>150</td><td>80</td><td>200</td><td>250</td><td>180</td><td>Total</td></tr>
<tr><td>No. of Persons</td><td>24</td><td>26</td><td>16</td><td>20</td><td>6</td><td>30</td><td>122</td></tr>
</table>

Arrange the income in ascending order.
Form the cumulative frequencies.
n = 122 (even), So, Median (M) = average of (n/2)th + (n/2 + 1)th
</td><td>7M</td></tr>
</table>

	• 61.5^{th} lies is the interval of 41 to 66. • Median value is 150.	
	OR	
Q.4 C	Explain representation of data using Pie charts, Histogram and Frequency Curve • Pie charts: • Most appropriate use: to represent data as part of a whole, to illustrate differences in categories (qualitative or discrete variables) provided the number of categories is limited (generally between 2 and 8). How to draw: Measure of the angle at the centre of the circle is proportional to the frequency (measure of the angle at the centre = frequency of the category/ total of all frequencies X 360^{O}) • Histograms: Most appropriate use: to represent grouped continuous variables. Always depicts frequency (or count) versus a continuous or nearly continuous variable. How to draw: Rectangles whose areas are proportional to the frequencies. The rectangles are adjacent (that is, the rectangles touch each other.) The axes are labelled, the graph has a title. • Frequency Curve: Explanation (2 Marks)	**8M**
Q.4 D	Calculate the mode of the following frequency distribution: • Prepare the grouping table and analysis table. • Column I: From the original frequencies, maximum frequency is marked. 24 • Column II: Frequencies of column I are combined two by two and maximum frequency is marked. 42 • Column III: Leaving the first frequency of column I and combine the others two by two. Again maximum frequency is marked. 46 • Column IV: Frequencies of column I are combined three by three and maximum frequency is marked. 52 • Column V: Leaving the first frequency of column I, combine the others three by three and maximum frequency is marked. 66 • Column VI: Leaving the first two frequencies of column I, combine the others three by three and maximum frequency is marked. 52	**7M**

Height in inches	58	59	60	61	62	63	64	65	66	67	Total
No. of Persons	4	6	5	10	20	22	24	6	2	1	100

	• After preparing the grouping table, column numbers are put on the left hand side and the probable values of mode on the right side in the analysis table. • Value (63) occurring maximum number of times (5) is the mode = 63	
Q.5	**Write short note: (Any three)**	
1	Feed-back inhibition Definition , mechanism and explanation with one example	**15M**
2	Active site. Definition and any 4 features.	
3	Any one modern vaccine. Peptide vaccine, subunit vaccine, DNA vaccine, edible vaccine.	
4	Any one precipitation technique. Ring test, ODD, Mancini, VDRL, Radial double diffusion, Electroimmunodiffusion, CIE, Rocket Electrophoresis	
5	Merits, demerits and uses of standard deviation. Merits – 2 marks, Demerits – 2 marks, uses – 1 mark	