

COURSE CODE (CREDITS): 21B1WBT731 (3)

MAX. MARKS: 35

COURSE NAME: HUMAN DISEASE AND DIAGNOSTICS

COURSE INSTRUCTORS: Dr. Rahul/Dr. Jitendraa/Dr. Saurabh MAX. TIME: 2 Hour

**Note:** (a) All questions are compulsory.

Q. No.	Question	CO	Marks																																				
Q1.	<p><b>Case Study:</b> Blood samples from eight different individuals was taken. Three drops from each sample was placed on a clean glass slide and antibodies (anti-A antibody, anti-B antibody, or anti-D antibody) were added to the blood drops. Provided below is the data obtained showing clumping/agglutination (+); and NO clumping/ NO agglutination (-) obtained.</p> <p>(a) Identify the blood group for each individual from the given data.</p> <table border="1" data-bbox="414 893 974 1379"> <thead> <tr> <th data-bbox="414 893 509 961">S.N.</th><th data-bbox="509 893 636 961">Anti-A</th><th data-bbox="636 893 763 961">Anti-B</th><th data-bbox="763 893 974 961">Anti-D (Rh)</th></tr> </thead> <tbody> <tr> <td data-bbox="414 961 509 1028">1</td><td data-bbox="509 961 636 1028">+</td><td data-bbox="636 961 763 1028">+</td><td data-bbox="763 961 974 1028">-</td></tr> <tr> <td data-bbox="414 1028 509 1096">2</td><td data-bbox="509 1028 636 1096">+</td><td data-bbox="636 1028 763 1096">+</td><td data-bbox="763 1028 974 1096">+</td></tr> <tr> <td data-bbox="414 1096 509 1163">3</td><td data-bbox="509 1096 636 1163">-</td><td data-bbox="636 1096 763 1163">+</td><td data-bbox="763 1096 974 1163">+</td></tr> <tr> <td data-bbox="414 1163 509 1230">4</td><td data-bbox="509 1163 636 1230">-</td><td data-bbox="636 1163 763 1230">-</td><td data-bbox="763 1163 974 1230">+</td></tr> <tr> <td data-bbox="414 1230 509 1298">5</td><td data-bbox="509 1230 636 1298">-</td><td data-bbox="636 1230 763 1298">+</td><td data-bbox="763 1230 974 1298">-</td></tr> <tr> <td data-bbox="414 1298 509 1365">6</td><td data-bbox="509 1298 636 1365">+</td><td data-bbox="636 1298 763 1365">-</td><td data-bbox="763 1298 974 1365">-</td></tr> <tr> <td data-bbox="414 1365 509 1432">7</td><td data-bbox="509 1365 636 1432">+</td><td data-bbox="636 1365 763 1432">+</td><td data-bbox="763 1365 974 1432">+</td></tr> <tr> <td data-bbox="414 1432 509 1500">8</td><td data-bbox="509 1432 636 1500">-</td><td data-bbox="636 1432 763 1500">-</td><td data-bbox="763 1432 974 1500">-</td></tr> </tbody> </table> <p>(b) Explain the immunological principle behind agglutination reactions in ABO Blood typing.</p>	S.N.	Anti-A	Anti-B	Anti-D (Rh)	1	+	+	-	2	+	+	+	3	-	+	+	4	-	-	+	5	-	+	-	6	+	-	-	7	+	+	+	8	-	-	-	II	[4]
S.N.	Anti-A	Anti-B	Anti-D (Rh)																																				
1	+	+	-																																				
2	+	+	+																																				
3	-	+	+																																				
4	-	-	+																																				
5	-	+	-																																				
6	+	-	-																																				
7	+	+	+																																				
8	-	-	-																																				
Q2.	<p>With reference to COVID-19 infection, answer the following:</p> <ol style="list-style-type: none"> <li data-bbox="144 1529 1255 1574">Name the diagnostic tests used for diagnosis of COVID-19 infection.</li> <li data-bbox="144 1585 1255 1675">Examine the features which may have led to rapid and world-wide spread of COVID-19?</li> <li data-bbox="144 1697 1255 1742">Provide possible solutions for controlling the spread of COVID-19?</li> </ol>	I	[1] [2] [3]																																				

Q3.	<p>a) Name one <b>diagnostic biomarker</b> used in prostate cancer.</p> <p>b) Which <b>gene variants</b> influence warfarin metabolism and sensitivity?</p> <p>c) State one <b>application of microbial biosensors</b>.</p> <p>d) Mention a <b>checkpoint inhibitor drug</b> used in PD-L1 positive cancers.</p> <p>e) Give one example of a <b>wearable biosensor</b>.</p>	III	[1 X 5 = 5]
Q4.	<p>a) Describe the <b>working principle of biosensors</b> with reference to their core components.</p> <p>b) A diabetic patient uses a <b>glucometer</b>. Explain the biosensor principle behind glucose monitoring.</p>	V	[3+2=5]
Q5.	<p>What is <b>pharmacogenomics</b> and why is it considered the foundation of personalized therapy?</p>	IV	[2]
Q6.	<p>Explain the structure of Deoxyribose nucleic acid and Ribose nucleic acid. Among the two, which molecule is more stable and why?</p>	I	[5]
Q7.	<p>Define the following in brief.</p> <p>a) Differentiate between Latent Tuberculosis and Active Tuberculosis</p> <p>b) Features of proteins with reference to primary, secondary and tertiary structures</p>	I, II	[6]