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SARDAR PATEL UNIVERSITY

M. Sc. Applied Science (Semester – I) Examination
Wednesday, 8th January 2014
10.30 a.m. to 1.30 p.m.

PET01EAS02: Quantitation of Biological Molecules and Introduction to Laboratory Medicine

Note : Figures to the right indicate full marks.   **Total Marks : 70**

Q. 1. Select the correct answer from the alternatives given below to the each question.   **(08)**

1. The value of Avogadro's number is _____ .

    (a) 62.3×10^{23} (b) 6.03×10^{23} (c) 6.023×10^{-23} (d) 6.023×10^{23}

2. The numerals of a measurement representing actual limits of precision are referred to as

    _____ .

    (a) Decimal point   (b) Significant digit   (c) Precision digit   (d) Metric

3. Which of the following enzyme is used in recombinant DNA technology to split a specific

    sugar phosphate bon in each strand of a DNA double helix?

    (a) Lipase   (b) Ligase   (c) Restriction enzyme   (d) Esterase

4. In a polymerase chain reaction, a synthetic sequence of nucleotides is involved in _____ .

    (a) Heating   (b) Denaturing   (c) Copying   (d) All of the above

5. Which of the following is normally absent in urine?

    (a) Glucose   (b) Ketone bodies   (c) RBC's   (d) All of the above

6. Conjugation of bilirubin takes place in _____ .

    (a) Liver   (b) Plasma   (c) Intestine   (d) Spleen

7. The organism most commonly associated with Urinary Tract Infection in a catheterised patient

    is _____ .

    (a) *E. coli*   (b) Pseudomonas   (c) Staphylococci   (d) Enterococci

8. Which one of the following is antigen is first to be detected in the circulation in Hepatitis B

    infected case?

    (a) HBsAg   (b) HBcAg   (c) HBeAg   (d) anti-HBcAg antibody

Q. 2: Answer the following in short **(ANY SEVEN).** (14)

[a] Define the isoelectric point. What will be the PI of glycine (pKa1= 2.34 and pKa2= 9.6)?

[b] Linear regression analysis for the standard curve yields the following equation: y=0.0079x + 0.0406. If absorbance of unknown sample at 595 nm is 0.44, what will be the protein concentration in mg/ml? A purified protein of unknown sample is diluted 5 μl into a volume of 100 μl.

[c] What are isotopes? Differentiate radioactive and stable isotopes.

[d] Define the term 'Nanotechnology'.

[e] Explain types of jaundice.

[f] What are normal haemoglobins?

[g] Explain normal constituents of blood and its functions.

[h] Explain laboratory diagnosis of enteric fever.

[i] Discuss agglutination tests.

Q. 3:

[a] (i) How is 50 ml of 20 milimolar (mM) sodium hydroxide (NaOH) prepared? (Molecular weight of NaOH is 40.0 gm) (03)

(ii) Express 2.5 M NaCl as a percent solution. (Molecular weight of NaCl is 58.44 gm) (03)

[b] (i) What is pH? What are the OH⁻ concentration and pH of a 0.01 M solution of HCl? (03)

(ii) Explain: what is conjugate base? What is the pH of a 0.02 M solution of sodium hydroxide (NaOH)? (03)

OR

[b] (i) 40 μl of stock solution of RNA is diluted with water to give a final volume of 1000 μl. The diluted sample has an absorbance at 260 nm of 0.142. What is the concentration of the RNA stock solution in μg/mL? (03)

(ii) A 1.0 mL sample of ssDNA has an absorbance of 0.285. What is its mM concentration? If A_{280} is 0.350, what is the A_{260}/A_{280} ratio? Interpret your results. (03)

Q. 4 :

[a] (i) What is rDNA technology? Enlist the applications of rDNA technology. (03)

    (ii) Describe the basic steps involved in the process of PCR. (03)

[b] (i) Define the term 'Gas Chromatography'? Draw the schematic of Instrumentation of GC. (03)

    (ii) List out the different detectors used in High Performance Liquid Chromatography. (03)

OR

[b] (i) What is RT- PCR? Mention two properties of RT-PCR. (03)

    (ii) Describe the utility of Nanotechnology in medicine. (03)

Q. 5:

[a] Describe urine examination in detail. (06)

[b] Laboratory diagnosis of hepatitis B virus infection. (06)

OR

[b] Write on lipid Profile. (06)

Q.6: Write short notes on:

[a] Segregation and disposal of biomedical waste. (06)

[b] Diabetic ketoacidosis. (06)

OR

[b] Morphology and life cycle of HIV. (06)

***** **End of Question Paper** ******