BIOTECHNOLOGY

PAPER 2

(PRACTICAL)

(Maximum Marks: 30)

(Time allowed: Three hours)

(*Candidates are allowed additional 15 minutes for **only** reading the paper. They must NOT start writing during this time.*)

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*Answer **all** questions.*

The intended marks for questions or parts of questions are given in brackets [ ].

Question 1

(a) Take a 2" piece of a ripe banana in a 100 ml beaker. Mash it properly. To this, add 30 ml of extraction fluid (labelled **EF**) provided to you.

Incubate the beaker at 60°C for 15 minutes. Stir the contents of the beaker gently with a glass rod and filter the content.

Allow the filtrate to cool. Take 5 ml of filtrate in a test tube and label the test tube as **D**. Gently add 5 ml of ice-cold 90% ethanol to test tube **D**. Allow the test tube to stand for 10 minutes. **Show the test tube to the Visiting Examiner.**

Answer the following questions:

(i) Name the substance obtained in the test tube after the completion of the experiment. **[1]**

(ii) State the method that will be used to extract the isolated substance from the test tube. **[1]**

(iii) Name the two contaminants present in test tube D, along with the isolated substance. **[1]**

(b) You are provided with vegetable oil (coconut oil), common salt (NaCl) and 20% sodium hydroxide (NaOH) solution.

Take 25 ml of vegetable oil in a measuring cylinder and pour it into a 250 ml glass beaker.

Measure 30 ml of 20% NaOH solution in another measuring cylinder. Pour it into the beaker containing vegetable oil. Stir the mixture using a glass rod. Place the beaker on a wire gauze placed over a tripod stand. Heat the beaker on a Bunsen burner till the mixture turns into whitish paste.

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Remove the beaker from the flame and allow it to cool. Check the acidic or basic nature of the mixture by using Litmus paper. Add 10 gm of NaCl to the above mixture and stir it with a glass rod. On adding NaCl, the soap gets precipitated. Isolate the soap by using filter paper and a funnel. **Show the precipitate on the filter paper to the Visiting Examiner**.

Answer the following:

(i) Name the process by which soap is obtained in this experiment. **[1]**

(ii) What is the use of common salt in the experiment? **[1]**

(iii) Based on the litmus paper test, state the nature of the mixture. **[1]**

Question 2

You are provided with a solution labelled **S** and a solution labelled **E.** Follow the steps given below**:**

Take three test tubes and label them as $\mathbf{S_1}$, $\mathbf{S_2}$ and $\mathbf{S_3}$.

(a) Pour 2 ml of solution **S** in each of these three test tubes.

(b) Next, take two test tubes and label them as $\mathbf{E_1}$ and $\mathbf{E_2}$. Pour 2 ml of solution **E** into both the test tubes. Place test tubes $\mathbf{E_1}$ and $\mathbf{S_1}$ in a water bath set at 90°C and test tubes $\mathbf{E_2}$ and $\mathbf{S_2}$ in a water bath set at 37°C for about 15 minutes.

(c) Next, add 2 – 3 drops of Iodine solution into test tube $\mathbf{S_3}$. Mix well and note the colour change.

(d) Remove test tubes $\mathbf{E_1}$, $\mathbf{S_1}$, $\mathbf{E_2}$ and $\mathbf{S_2}$ from the water baths.

(e) Pour the solution in test tube $\mathbf{E_1}$ into test tube $\mathbf{S_1}$ and the solution in test tube $\mathbf{E_2}$ into test tube $\mathbf{S_2}$. Mix well and allow the test tubes $\mathbf{S_1}$ and $\mathbf{S_2}$ to stand for 10 minutes.

(f) Add 2 - 3 drops of iodine solution to each of the two test tubes, $\mathbf{S_1}$ and $\mathbf{S_2}$. Observe the colour change.

Answer the following questions:

(i) Report your observations and inference for the test tubes S_1 and S_2, in a tabular form as shown below: **[2]**

Test tube	Observation	Inference
S_1		
S_2		

(ii) What is the colour change in test tube S_3? Give the reason for the colour change. **[1]**

(iii) Identify solution S and solution E, based on the above tests. **[1]**

(iv) Mention the reason for colour change in test tubes S_1 and S_2. **[1]**

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Question 3

You are provided with 1 gm peptone, 0·5 gm yeast extract, 0·5 gm NaCl and 1·5 gm agar. Using these substances, prepare a 100 ml culture medium in a 250 ml flask, following the steps given below:

Put the given substances in a 250 ml beaker and mix them well, using a glass rod. Mark the final volume to 100 ml by adding distilled water. Note the pH by using a pH paper. Adjust the pH to 7 by adding either dil. NaOH or dil. HCl, as required.

Transfer the content to a 250 ml flask. Put a cotton plug at the mouth of the flask. Sterilise the flask in an autoclave.

After sterilisation, allow the content to cool. Pour 2 ml of the culture medium in a petri plate and 5 ml in a test tube to make a slant. **Show the petri plate and the slant to the Visiting Examiner**.

Answer the following:

(a) How was the slant prepared in the test tube? **[1]**

(b) What is the importance of preparing a slant? **[1]**

(c) What causes solidification of culture medium? **[1]**

(d) What is the importance of sterilising the culture medium in an autoclave? **[1]**

Question 4

Show the following to the Visiting Examiner for assessment:

(a) Project **[10]**

(b) Biotechnology Practical File **[5]**