

## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	1

Name of the student:

Pargat Singh Dharyal

Signature of the student:

Pargat

Q1)

A)

1.) d) The properties of polymers are not time dependant.

2.) b) Polysiloxane

3.) a) below

4.) b) single walled arm chair CNTs or Multi walled CNTs.

5.) a)  $A = -\log_{10}(1/T)$ 

6.) d) Chloroform

7.) c)  $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot x\text{SiO}_2 \cdot y\text{H}_2\text{O}$ ; where  $x = 2-6$  or  $y = 2-10$ 

8.) a) Primary treatment

9.) a) Zero

10.) c) NMR spectroscopy

## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	2

Name of the student: Pargat Singh Dharyal	Signature of the student: Pargat
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- Q1)  
B)
- 2) The conductivity of CNT have been found to be function of their chirality, degree of twist as well as diameter. CNTs can either be metallic or semi-conductors, resistivity of single walled nanotubes were in the order of  $10^{-4}$  ohm cm at  $27^{\circ}\text{C}$  making them the most conductive carbon fiber. The defects in SWNT allows them to act like transistors, rectifying diodes.
- 3) Polymers can be classified based on their conductance of electricity into.
- Intrinsically conducting polymers (ICP)  
eg:- Polyaniline, Polybutadiene.
  - Doped conducting polymer (DCP)  
eg:- Polyacetylene (p doping or n doping)
  - extrinsically conducting polymer (ECP)  
eg:- carbon black - polymer, metal oxide based polymers.
- 6) Energy efficiency:-
- The energy requirements of chemical processes should be minimized considering their environmental & economic impacts.
  - This can be achieved by the means of catalysts or by stopping use of fossil gases which causes pollution.
  - Using fermentation process for chemical synthesis where energy requirement is low & products are less harmful.

## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	3

Name of the student: Pangat Singh Dhanjal	Signature of the student: <i>Pangat.</i>
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Q1) B)

$$7) \quad C = 2.3 \times 10^{-5} \text{ M} \quad L = 1 \text{ cm} \quad T = 45\%$$

$$\therefore A = 2 - \log(T)$$

$$A = 2 - \log 45$$

$$A = 2 - 1.65$$

$$A = \underline{0.35}$$

$$\text{Using, } A = ELC$$

$$\therefore \Rightarrow \frac{A}{LC} = \frac{0.35}{1 \times 2.3 \times 10^{-5} \text{ M}}$$

$$= 1521 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$$

- 5) A two point method is used to standardize the pH meter, we first ~~more~~ immerse the pH assembly i.e glass electrode into a standard reference pH buffer (pH = 4.0) & recording the reading if its more or less than pH = 4 then we adjust it using the screw knob. Then a second reference buffer of pH = 9.2 is used & the above procedure is repeated. During both steps the glass electrode is rinsed with distilled water. After that we can start the measurement after 5 minutes after switching on. Rinse the detecting unit with water & blot the water gently with a piece of filter paper.

## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	4

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Q2) 2)

 $\text{CH}_4 = 45\%$      $\text{H}_2 = 5\%$      $\text{C}_3\text{H}_8 = 12\%$      $\text{CO} = 11\%$      $3\text{m}^3$  of fuel

Constituents	Vol in $3\text{m}^3$	Reactions	MF	Vol of $\text{O}_2$ required
CO	$0.33\text{m}^3$	$\text{CO} + \frac{1}{2}\text{O}_2 \rightarrow \text{CO}_2$	$\frac{1}{2}$	0.165
$\text{CH}_4$	$1.35\text{m}^3$	$\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$	2	2.70
$\text{H}_2$	$0.15\text{m}^3$	$\text{H}_2 + \frac{1}{2}\text{O}_2 \rightarrow \text{H}_2\text{O}$	$\frac{1}{2}$	0.075
$\text{C}_3\text{H}_8$	$0.36\text{m}^3$	$\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$	5	1.8
$\text{O}_2$	$0.81\text{m}^3$		-1	-0.81

Vol of  $\text{O}_2$  required for combustion =  $3.93\text{m}^3$

Vol of air  $100\text{dm}^3 = 21\text{m}^3$  of  $\text{O}_2$

$$\therefore 3.93\text{m}^3 = 3.93 \times \frac{100}{21} = 18.71\text{m}^3 \text{ of air}$$

Weight of air required =  $18.71 \times 10^6$  g of air.

## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	5

Name of the student:

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Pangat

Q2)

- 3) Moisture can be removed from crude oil using Cottrell's process wherein we pass the crude oil between two highly charged electrodes. Colloidal water droplets combine to form large droplets which then can easily be separated out. Sulphur content is removed ~~using~~ by treating oil with copper oxide.

The Advantages of catalytic cracking are:-

- Petrol is the higher yield.
- Lower pressure is required for catalytic cracking.
- No external heat is required as the regenerated catalyst provides the heat.
- The product can easily be controlled hence better knocking characteristic.
- The octane number or quality of petrol is higher.
- Catalyst is selective hence permitting the cracking of only high boiling hydrocarbon.

## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	6

Name of the student:

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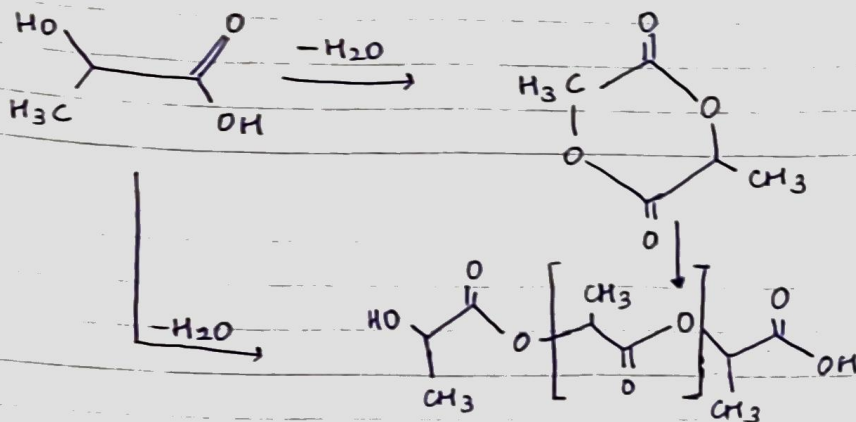
Signature of the student:

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Q3)

1) Polylactic acid is a thermoplastic ~~polymer~~ polyester.

a) Synthesis



b) Properties

- It is biodegradable
- It is soluble in many organic solvent
- It can be converted into fiber.
- It is a linear thermoplastic polymer

c) Applications

- Used in various consumer products such as disposable tableware, cutlery housing for kitchen appliances, trays and electronic devices.
- PLA can degrade into innocuous lactic acid so it is utilized in medical implants in various form like rods, pins, mesh, etc.

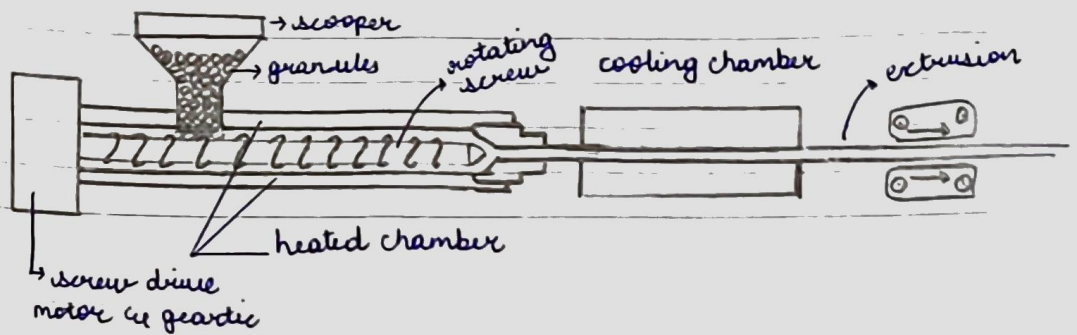
## Answer Sheet: Online Examination

Roll No.:	16010121045	
Course	EC	Page No
Date	23/2/22	7

Name of the student: Pangat Singh Chahal	Signature of the student: <u>Pangat</u>
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Q3)

2) extrusion molding is used whenever continuous moulding materials like cables, wires & sheets is to be manufactured.



Thermoplastic materials are molded via this process. First they undergo continuous moulding to form articles of uniform cross section. Here they are heated to plastic condition & pushed using a screw conveyor into a mould cavity having required shape to be manufactured. Then they are cooled off in the cooling chamber using atmospheric exposure. They then are manufactured & gets carried away on a conveyor.

## Answer Sheet: Online Examination

Roll No.:	160101 21045	
Course	EC	Page No
Date	23/2/22	8

Name of the student: Pangat Singh Charjal	Signature of the student: <u>Pangat</u>
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Q4)

- 1) Conductometric titration is a type of titration in which electrolytic conductivity of the reaction mixture is checked continuously as we add titrate to titrant.

The advantages are:-

- It can be used to titrate coloured solutions.
- Both strong & weak acids can be titrated with ease.
- Works for dilute solutions too as it depends on change in conductance.
- It is not compulsory to make observations around equivalence point with small increments of titrant.

The limitations are as follows.

- For dilute solutions it is harder to predict as we get an obtuse curve.
  - The accuracy of this method is limited as it ~~is~~ doesn't allow small increments.
- 2) IR can provide a molecular fingerprint which can be utilised in comparing samples. It provides information on molecular fragments specifically functional groups. The range from  $600 - 1400 \text{ cm}^{-1}$  is called the fingerprint region.

- |    |        |              |  |
|----|--------|--------------|--|
| a) | $=C-H$ | (alkene C-H) | stretch (3010 - 3100)<br>bending (675 - 1000)  |
| c) | $C-O$  | (ether)      | stretch (1000 - 1300)<br>bending (1070 - 1150) |
| b) | $-C=O$ | (carbonyl)   | stretch (1670 - 1820)                          |