Time: 2 ½ Hours **Total Marks: 75**

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q.2, Q.3 and Q.4** attempt A and B **OR** C and D.

Q.1 Do as directed: (Any fifteen) **15**

1. State true or false: Nucleic acids absorb light at 260 nm through the adenine residues.
2. State true or false: After release of DNA from the cell, further purification requires removal of contaminating proteins, lipids, carbohydrates, and cell debris which is achieved by a mixture of Phenol and chloroform.
3. Fill in the blank: In Southern blotting, the double stranded DNA fragments in the gel must be denatured and transferred to a _____ membrane.
4. Explain the role of restriction endonucleases.
5. Fill in the blank: Proteins are separated using _____ electrophoretic technique.
6. Fill in the blank: Taq DNA polymerase enzyme from _____has facilitated the process of molecular diagnostics.
7. In paternity testing, if a man lacked the allele that must have come from the baby's father, then the DNA typing data would have proved that he is not the father; this is known as _____ result.
8. Give an example of chelator present in master mix.
9. Fill in the blank: The type of PCR control which ensures that the enzyme is active, the buffer is optimal, the primers are priming the write sequences, and the thermal cycler is cycling appropriately is called as _____.
10. Fill in the blank: _____ is used to increase the effectiveness of UV light to decontaminate and maintain pre-PCR area.
11. Fill in the blank: The *Tth* polymerase is isolated from _____.
12. Give an example of: Monovalent cations present in PCR master mixture
13. Define the term 'amplicons'.
14. What is the significance of thermocyclers?
15. State true or false: Presence of quasi species of HIV is due to the error-prone nature of the reverse transcriptase enzyme.
16. Fill in the blank: It is the time period between exposure to HIV and before seroconversion is known as _____.
17. State true or false: Pace-2 is a second generation hybridisation assays used for *N.gonorrhoeae.*
18. Fill in the blank: _____gene analysis is done to detect fragile X diagnostic.
19. Fill in the blank: Intrapartum transmission of *N.gonorrhoeae* produces _____ condition in neonates.
20. Fill in the blank: _____ is the process of determining an individual's DNA characteristics, which are as unique as fingerprints.

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Q. 2 A	What is molecular diagnostics? Explain in detail the of mutation detection techniques in molecular diagnostics.	**08**
Q. 2 B	Elaborate on FISH as a hybridisation technique.	**07**
	OR	
Q. 2 C	Discuss the organic and inorganic method for isolation of DNA.	**08**
Q. 2 D	Explain western blotting in detail.	**07**
Q. 3 A	Give working principle of qRT PCR.	**08**
Q. 3 B	Discuss any three components of PCR.	**07**
	OR	
Q. 3 C	What is the function of DNA polymerase in PCR? What are the different types of DNA polymerases used in PCR method?	**08**
Q. 3 D	How to control contamination in PCR?	**07**
Q. 4 A	Discuss uses of genetic testing.	**08**
Q. 4 B	Elaborate on HIV and clinical significance of viral load in the serum sample.	**07**
	OR	
Q. 4 C	How RFLP is used to detect sickle cell anaemia?	**08**
Q. 4 D	Explain clinical significance of *N.gonorrhoeae*.	**07**
Q. 5	Write Short notes on **any three** of the following	**15**
a.	Northern blotting.	
b.	Any one method for labelling of a probe.	
c.	Reverse Transcriptase PCR.	
d.	Mispriming.	
e.	Any one commercial assay available to detect HIV1 virus.	

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2 ½ Hours

Total Marks: 75

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q 2, Q 3 and Q 4** attempt A and B **OR** C and D.

Q.1. Do as directed:(Any fifteen) **15**

1. Define indigenous flora.
2. Fill in the blank: The disease in which patient experiences no symptoms of disease and does not seek medical attention is known as _____.
3. State the importance of Keratinase.
4. State true or false: Streptolysins are an example of exotoxin.
5. Give one word for: Accumulation of fluid in affected tissue.
6. Fill in the blank: Boil is an example of _____infection.
7. Name any one culture medium for isolation of *Mycobacterium tuberculosis*.
8. State true or false : Swarming of *Proteus species* does not occur on MacConkey's agar medium.
9. Fill in the blank: For treatment of Methicillin Resistant *Staphylococcus aureus* _____ antibiotic is used.
10. Name any one virulence factors of *Streptococcus pneumoniae.*
11. Enlist any one predisposing factors for Urinary tract infections.
12. Name any one biochemical test employed for identification of *S. pyogenes.*
13. Name the pathogen producing Toxic Shock Syndrome Toxin.
14. State true or false: A nonvenereal infection in the new-borns is called ophthalmia neonatorum.
15. Name toxin produced by Shigella species.
16. What is Teflon pathogen?
17. Causative organism of 'Blue Pus' is -------.
18. State true or false: Congenital syphilis can be transmitted from mother to foetus.
19. Name one antibiotic used in the treatment of typhoid fever.
20. State true or false: *P. aeruginosa* produces pigment, pyoverdin.

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Q.2 A There are different patterns of infection observed, justify. **08**

Q.2 B Discuss mechanism of adhesion by pathogens. **07**

OR

Q.2 C Give a brief account of different portals of exit of a pathogen from its host. **08**

Q.2 D What is Epidemiology? Discuss the various types on the basis of the frequency of occurrence in a population and area of spread. **07**

Q.3 A Elaborate on various enzymes & cell surface structures produced by *Staphylococcus aureus* which help in its pathogenesis. **08**

Q.3 B Give an account on laboratory diagnosis of respiratory infections by *S. pneumoniae* and add a note on its treatment. **07**

OR

Q.3 C Discuss various virulence factors of *Streptococcus pyogenes*. **08**

Q.3 D Describe Quantitative & Semiquantitative urine cultures. **07**

Q.4 A Elaborate on primary, secondary and tertiary stages of syphilis. **08**

Q.4 B Discuss the role of *Pseudomonas* in nosocomial infection & give its treatment. **07**

OR

Q.4 C Explain gonorrheal arthritis and lab diagnosis of gonorrhea. **08**

Q.4 D Discuss causative agent & pathogenesis of bacillary dysentery. **07**

Q.5 Write Short notes on **any three** of the following: **15**

a. Pattern of transmission in communicable disease.

b. Normal flora of genitourinary tract.

c. Prophylaxis & control of Tuberculosis.

d. EHEC.

e. Pathogenesis of typhoid fever.

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2 ½ Hours

Total Marks: 75

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q.2, Q.3 and Q.4** attempt A and B **OR** C and D.

Q.1. Do as directed:(Any fifteen) **15**

1. What is Sheet erosion?
2. What is Hazardous waste?
3. State true or false: Dioxin is the carcinogenic by-product of plastic manufacturing process.
4. Define Photochemical smog.
5. Give one example of particulate air pollution.
6. Fill in the blank: _____ pollution is a resultant effect of pollutants coming from specific point or location.
7. What are SOx?
8. State the full form of IPCC.
9. Name any one greenhouse gases which damage the stratospheric ozone layer.
10. Fill in the blank: Two major mechanisms for living entities to overcome global warming are_____ and sequestration.
11. State any one adaptation strategy that could be used to deal with climate change in dry and sub-humid land?
12. What is Antarctic Ozone hole?
13. Fill in the blank: When fluorine, chlorine or bromine attach to carbon they form a group of compounds called _____.
14. Fill in the blank: Inside polar vortex, increase in chlorine monoxide correlates to decrease in_____.
15. Give one difference between Biostimulation and Bioaugmentation.
16. Give an example of plant used in bioremediation.
17. Give one word for: It is accessibility of the contaminant/pollutant to the organism.
18. State true or false Phytoextraction is defined as the uptake and degradation of organic compounds.
19. What do you mean by preliminary assessment in bioremediation?
20. Give an example of plant used in bioremediation.

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Q.2 A	"Biological treatment methods are effective in treating even low concentration of contamination in air." Justify.	**08**
Q.2 B	Define water pollution? Explain types of water pollution.	**07**
	OR	
Q.2 C	Explain the steps involved in water quality assessment.	**08**
Q.2 D	What is Eutrophication? Enlist the measures to control eutrophication.	**07**
Q.3 A	What is greenhouse effect? Explain briefly.	**08**
Q.3 B	Give the significance of Kyoto protocol with respect to climate change.	**07**
	OR	
Q.3 C	Describe the mechanism which can be adopted to overcome climate change.	**08**
Q.3 D	Elaborate on Chloroflurocarbon family, its production and uses.	**07**
Q.4 A	Give a brief account on technique of In-situ bioremediation with suitable example	**08**
Q.4 B	How would you monitor efficacy of bioremediation?	**07**
	OR	
Q.4 C	Give a brief account on technique of Ex-situ bioremediation with suitable examples.	**08**
Q.4 D	Discuss phytoremediation methods to remove metal pollutant.	**07**
Q.5	Write Short notes on **any three** of the following:	**15**
a.	Soil erosion.	
b.	Antarctic Ozone Hole.	
c.	Effects of global warming.	
d.	Bioventing.	
e.	Measurement of bioremediation in field.	

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Q. P. Code: 33977

2 ½ Hours

Total Marks: 75

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q.2, Q.3 and Q.4** attempt A and B **OR** C and D.

Q.1 Do as directed (Any fifteen) **15**

1. Who is an entrepreneur?
2. State true or false: The expansion of big businesses is the reason for burial of small entrepreneurs.
3. Balanced Regional development includes _____.
   a) road transport b) health education
   c) entertainment d) All of the above
4. State true or false: Over confidence is an important characteristic of a successful entrepreneur.
5. State true or false: An entrepreneur should possess sound human relations ability.
6. Give name of any one self-made company.
7. Mention any one advantage of being an entrepreneur.
8. What is the significance of equity shares capital?
9. _____ is a type of Intellectual Property Right that grants property rights on an invention, allowing the patent holder to exclude others from making, selling, or using the invention.
10. What is a debenture?
11. Name any one financial investment institutions set up by government in India.
12. _____ is a predetermined standard used to estimate performance in expenditure, income, sales, purchase, profits and investments.
13. State true or false: Entrepreneurship provides an obstacle to the socioeconomic development of a country.
14. What is Market research?
15. Define Packaging.
16. _____are an outcome of functional strategy.
17. Selling is one of the _____ functions of a business form
    i) Secondary ii) Primary iii) Tertiary iv) None of the above
18. The first two elements of business planning are essentially conceptual and _____.
19. Define Product.
20. Explain the meaning of the term Corporate mission.

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Q. P. Code: 33977

Q. 2 A	Explain the need and importance of entrepreneurship in a country.	**08**
Q. 2 B	Explain the factors which are necessary for a person to become a successful entrepreneur.	**07**
	OR	
Q. 2 C	State the factors influencing entrepreneurship.	**08**
Q. 2 D	Explain the characteristics of an entrepreneur.	**07**
Q. 3 A	What are the steps to be considered while preparing a Business plan?	**08**
Q. 3 B	Discuss Shares Capital as a source of fund for a business.	**07**
	OR	
Q. 3 C	State the objectives of business budgeting.	**08**
Q. 3 D	Elaborate on factors that influence Financial planning.	**07**
Q. 4 A	"Questionnaire Design is a very important aspect for research", explain giving examples.	**08**
Q. 4 B	Give an account on the functions of packaging of goods.	**07**
	OR	
Q. 4 C	Discuss the six step process to determine the positioning strategy.	**08**
Q. 4 D	Classify and explain the types of consumer goods.	**07**
Q. 5	Write Short notes on **any three** of the following	**15**
a.	Entrepreneurship.	
b.	Role of Government in entrepreneurship development.	
c.	Importance of Business Planning.	
d.	Trade characters &Advertising.	
e.	International Market Research.	

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Q. P. Code: 33983

2 ½ Hours

Total Marks: 75

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q 2, Q 3 and Q 4** attempt A and B **OR** C and D.

Q 1 Do as directed (Any fifteen) 15

1. _____ is not an input device.
   a. Mouse b. Keyboard c. Stylus d. Printer
2. _____ is a finite, precise, unambiguous sequence of instructions capable of being carried out by a machine in a finite time.
   a. Logarithm b. Flowchart c. Algorithm d. Recipe
3. A memory cell which does not lose the bit stored in it when no power is supplied to the cell is known as a _____.
   a. non-volatile cell b. volatile cell c. battery cell d. permanent cell
4. _____ is an example of EEPROM.
   a. CD-ROM b. Floppy disk c. Magnetic tape d. Flash drive
5. *AND, OR* and *NOT* are examples of _____ operators.
   a. computer b. Boolean c. Euclidean d. Newtonian
6. _____ is not an internet protocol.
   a. http b. https c. ftp d. wwwp
7. _____ is a specialized database for baker's yeast.
   a. Pubmed b. Taxonomy c. ProSite d. SGD.
8. Algorithm used to compute Local Alignment.
9. What is phylogenetic analysis?
10. Define Algorithm.
11. What is a subsequence?
12. Define Noise with respect to bioinformatics.
13. What is E-value?
14. What is a Probe?
15. The value of coefficient of correlation is _____, if the two variables show perfect negative correlation.
16. If X is dependent variable and Y is independent variable, what is the regression line?
17. A contingency table in a chi-square test has 3 rows and 3 columns, what will be the degree of freedom?
18. How is type II error made in statistical hypothesis testing?

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19. State true or false: Z-test is used when the sample size is more than 30.
20. What is null hypothesis?

Q. 2 A With suitable examples explain - primary and secondary databases. **08**

Q. 2 B Explain the need for classifying proteins based on motifs and patterns. **07**

OR

Q. 2 C Elaborate on the databases classifying proteins based on structure. **08**

Q. 2 D Comment on Rasmol as a protein visualization software. **07**

Q. 3 A Explain BLAST. **08**

Q. 3 B What do you understand by Dot plots? How does it differ from dynamic programming? **07**

OR

Q. 3 C PSI-BLAST is a popular program for exploring protein family relationships. Discuss the areas of applications of this program. **08**

Q. 3 D How can you compute global alignment using the Needleman-Wunsch algorithm? **07**

Q. 4 A Find Coefficient of correlation for the following data: **08**

X	1	2	3	4	5
Y	1	2	3	4	5

Q. 4 B Explain Chi-square with a suitable example. **07**

OR

Q. 4 C Calculate regression coefficients b_{xy} and b_{yx} for the following data and calculate x when y =15. **08**

x	Mean = 10	Standard deviation is 8	Coefficient of correlation is +1
y	Mean = 20	Standard deviation is 10	

Q. 4 D What is t-test? Give its two types. **07**

Q. 5 Write Short notes on **any three** of the following **15**

a. Operating system.

b. World Wide Web.

c. Gapped BLAST.

d. Multiple Sequence Alignment.

e. Types of correlation.

****

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2 ½ Hours **Total Marks: 75**

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q 2, Q 3 and Q 4** attempt A and B **OR** C and D.

Q 1 Do as directed (Any fifteen) **15**

1. Precursor amino acid for biosynthesis of serotonin is _____.
2. Synthesis of glucose from non-carbohydrate precursors is accomplished by a pathway called _____.
3. The number of NADPH produced when one molecule of Glucose 6-phosphate completes oxidative phase of HMP shunt is _____.
4. Give one example of glucogenic amino acid.
5. Name one enzyme of Glyoxalate cycle that is not present in vertebrates.
6. Name the organ in which urea is produced in humans.
7. Give one example of energy rich compound.
8. State True / False: Non-oxidative deamination of histidine releases ammonia.

Write the equation for the reaction catalysed by following enzymes: -

9. Citrate synthase.
10. Glutamate dehydrogenase.

Name the enzyme that catalyses the conversion of following reactions: -

11. Arginine to ornithine.
12. Glyceraldehyde 3-phosphate to 1,3-bisphosphoglycerate.
13. The reactions of ketone body formation occur in the matrix of ……

    a. kidney mitochondria b. liver mitochondria

    c. kidney cytosol d. liver cytosol
14. The absence of Hypoxanthine-Guanine Phosphoribosyl Transferase activity is observed in _____.

    a. Lesch-Nyhan syndrome b. Zellweger syndrome

    c. Refsum's disease d. X-linked adrenoleukodystrophy

15. _____ are lipid-binding proteins in the blood which transports triacylglycerols, phospholipids, cholesterol, and cholesteryl esters between organs.
    a. Apolipoproteins b. Lipases
    c. Carboxylases d. Chylomicrons
16. The fatty acyl group is enzymatically transferred from Carnitine to intra-mitochondrial Coenzyme A by _____.
    a. Carnitine Acyltransferase II, b. Lipase,
    b. Carboxylase, d. Carnitine Acyltransferase I
17. Propionyl-CoA is first carboxylated to form the D stereoisomer of methyl malonyl-CoA by _____ .
    a. Propionyl-CoA Carboxylase, b. Methylmalonyl-CoA Epimerase,
    c. Methylmalonyl-CoA Mutase, d. Thiolase
18. Branched fatty acids are catabolized in peroxisomes of animal cells by
    a. ω oxidation b. α oxidation c. β oxidation d. μ oxidation
19. Phosphorylation of _____ permits hormone sensitive lipase access to the surface of the lipid droplet.
    a. perilipin b. triacylglycerols c. carnitine d. acyl-CoA
20. The overall equation of Palmitoyl-CoA beta oxidation is:
    Palmitoyl-CoA + 7CoA + 7FAD + 7NAD^+ + 7H_2O
    → _____ + 7$FADH_2$ + 7NADH + 7H^+
    a. 8 Acetyl-CoA b. 7 Acetyl-CoA
    c. 14 Acetyl-CoA d. 16 Acetyl-CoA

Q. 2 A Discuss the reactions involved in the non-oxidative phase of the pentose phosphate pathway. **08**

Q. 2 B Explain the regulation of glycolysis pathway. **07**

OR

Q. 2 C With the help of a neat labelled diagram explain the structure and mechanism of rotary motor model for ATP generation. **08**

Q. 2 D Describe the Glyoxalate cycle and add a note on its significance. **07**

Q. 3 A	Justify: Amino acids are degraded to metabolites that integrate into Krebs cycle.	**08**
Q. 3 B	Discuss the metabolic disorders associated with defects in urea cycle.	**07**
	OR	
Q. 3 C	Describe the mechanism of Transamination of amino acids.	**08**
Q. 3 D	Explain the structure of glutathione and state its significance.	**07**
Q. 4 A	Describe beta oxidation of saturated fatty acids.	**08**
Q. 4 B	Give detailed account of Purine catabolism.	**07**
	OR	
Q. 4 C	Elaborate reactions involved in the α-oxidation of a branched-chain fatty acid.	**08**
Q. 4 D	Explain three additional reactions involved in complete oxidation of odd number fatty acid.	**07**

Q. 5	Write Short notes on **any three** of the following:	**15**
a.	Metabolic disorders associated with pentose phosphate pathway.	
b.	Role of coenzyme Q in ETC.	
c.	Non oxidative deamination.	
d.	Role of Cyclic AMP–dependent protein kinase (PKA) in triacylglycerol mobilization.	
e.	ω- oxidation of fatty acid.	

2 ½ Hours **Total Marks: 75**

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.
5. For **Q 2, Q 3 and Q 4** attempt A and B **OR** C and D.

Q 1 Do as directed (Any fifteen) **15**

1. _____ sampling requires minimum knowledge of bulk material.

   a) Systematic b) Random c) Gross

2. Which of the following affects the procedure of sampling?

   a) Size of sample b) Cost of sampling c) Location of sample

3. Partition coefficient and distribution ratio will be _____ .

   a) always equal
   b) always different
   c) equal if molecular condition is same
   d) equal when molecular condition is different

4. High boiling point liquids are separated using _____ .

   a) Fractional distillation b) Vacuum distillation c) Filtration

5. Liquid-liquid extraction is also known as _____ .

   a) Solvent extraction b) Filtration c) Vacuum distillation

6. Solubility _____ with increase in temperature

   a) increases b) decreases c) remains the same

7. Centrifugation is used for separation of solid from _____.

   a) Solid b) Liquid c) Gases

8. Which of the following is a primary metabolite?

   a) Amino acids b) Terpenoids c) Phenolics

9. Cholesterol is an example of _____ .

   a) Steroid b) Phenolic c) Alkaloid

10. Isoprenes are the basic unit of _____ .

    a) Terpenoids b) Alkaloids c) Phenolics

11. What does TLC stand for?

    a) Thick layer chromatography b) Thin layer chromatography
    c) Thick liquid chromatography

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12. Which of the following is not a fully automated procedure?
    a) GC b) HPLC c) HPTLC
13. Essential oils are mostly derived from _____ .
    a) Plants b) Animals c) Soil
14. Which of the following is an example of a polymer?
    a) Ethene b) Polyethene c) Ethane
15. Which of the following is a heat stable polymer?
    a) Plastic b) Thermoplastic c) Thermosets
16. Which of the following is an addition polymer?
    a) Polyethene b) Polyester c) Polyamides
17. Which of these is a physical method of nanoparticle synthesis?
    a) Mechanical grinding b) Nucleation c) Sol-gel formation
18. Which of the following can be used to make nanotubes?
    a) Carbon b) Sulfur c) Phosphorus
19. Nanoparticles made by chemical synthesis produce what type of solutions?
    a) True solution b) Colloidal Solution c) Suspensions
20. Which of the following microscopes is used for characterization of nanoparticles?
    a) Light Microscope b) Dark Microscope c) Electron Microscope

Q. 2 A Explain the importance of sampling and sampling techniques. **08**

Q. 2 B Describe the process of distillation as a separation technique. **07**

OR

Q. 2 C Give the basic principles of sedimentation. **08**

Q. 2 D What is solvent extraction? Explain in brief. **07**

Q. 3 A Explain the classification of natural products based on biosynthesis. **08**

Q. 3 B What is HPTLC? Give its applications in analysis of natural products. **07**

OR

Q. 3 C Give the steps of structure determination of natural products. **08**

Q. 3 D What are phenolics? Give their significance and uses. **07**

Q. 4 A What are the different types of polymers? Explain with examples. **08**

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Q. 4 B Compare and contrast between addition and condensation polymers giving suitable examples. **07**

OR

Q. 4 C Explain the different methods of synthesis of nanomaterials. **08**

Q. 4 D What are nanoparticles? Explain their properties. **07**

Q. 5 Write Short notes on **any three** of the following **15**

a. Non-Random Sampling.

b. Secondary metabolites.

c. Alkaloids.

d. Thermoplastics.

e. Nanomaterial.

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