R7289	Sub. Code
	501301

M.Sc. (Biotechnology) DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

BIOPROCESS ENGINEERING AND TECHNOLOGY

(CBCS – 2020 onwards)

Time : Three Hours Maximum : 75 Marks

Part A (30 × 1 = 30)

Answer **all** questions.

1. Continuous enrichment techniques are emerged as the pivotal tool in isolating organisms to be used in a ————————.

2. Unit of maximum specific growth rate (μ max) is ————————.

3. ———————— is the model that was proposed to define microbial kinetics with lag phase and corresponds to the well-known exponential model extended with a first-order lag.

4. In oleaginous yeast, ———————— pathway is considered to be the predominant NADPH provider for lipid biosynthesis.

5. ———————— is the aerobic fermenter type that are employed most widely for aerobic fermentation.

6. The process of destroying enzyme activity in fruits and vegetables is called as ————————.

7. Most of the secondary metabolites are toxic to the synthesizing cell when it is present in the ———————— of the growth curve.

8. ———————— is routinely used for separating mycelium from fermentation broth in antibiotic fermentations.

9. The beer undergoes ———————— process to prevent the precipitation of protein which causes cloudiness.

10. ———————— is not a fermented product.

    (a) Condensed milk

    (b) Cheese

    (c) pickle

    (d) lactic acid

11. Corn steep liquor is a good source of ————————.

    (a) Nitrogen

    (b) Carbon

    (c) Starch

    (d) Potassium

12. Pickling is the process of ———————— type fermentation.

13. Glucose oxidase utilizes ———————— to catalyze the β-d-glucose oxidation.

14. ———— are the three amino acid residues are considered the catalytic triad of chymotrypsin.

15. ———— is a sweetener made from corn starch.

16. Under steady-state conditions the specific growth rate is controlled by an experimental variable known as ————.

17. ———— is the organism used to produce bioflocculants.

18. ———— is the enzyme which can be employed for mashing in the brewing industry.

19. Bacterial protease can be used in the photography industry to recover ———— from the spent film.

20. In the soft drink industry, glucose oxidase can be used for the ———— process.

21. ———— is the amino acid which is regarded the precursor of the sweetener aspartame.

22. ———— is the secondary metabolite that can act as cholesterol lowering agent.

23. In Pruteen animal feed process, ———— is used as carbon source.

24. In batch culture ———— is that phase where the growth rate has declined to zero.

25. ———— has been extensively studied as substrate for kefir-based dairy industry.

26. ———— is the enzyme used to produce lipolyzed milk fat.

27. ———— is the well-known enzyme used for mash treatment and juice clarification.

28. ———— is the enzyme used for beer maturation.

(a) Acetolactate decarboxylase

(b) Pullulanase

(c) Xylose isomerase

(d) Transglutaminase

29. ———— is the enzyme used for removal of bitter taste in fruit juice.

30. ———— is the mission developed by the Government of India that brings the scientific processing of waste of extract worth.

Part B $(10 \times 2 = 20)$

Answer any **ten** questions.

31. Write about the necessity of high-throughput screening in strain selection.

32. Define Prime-del.

33. How does the protease regulate the high moisture content of cheese?

34. Define probiotics.

35. What is mixotrophic cultivation?

36. Explain the need for an economic evaluation process before the commercialization of fermentation products.

37. Define biotransformation.

38. Define oleaginicity.

39. Describe the process of deoxygenation.

40. Describe the process of transesterification.

41. Describe the commercial significances of yeast in alcohol industries.

42. Explain the role of UV mutagenesis in strain improvement.

Part C $(5 \times 5 = 25)$

Answer any **five** questions.

43. Explain the process of adaptive laboratory evolution and its limitations.

44. Explain in detail the genome shuffling methodology for strain improvement.

45. How would you overcome the acetate co-production in engineered *Escherichia coli* during recombinant protein fermentations?

46. Comment on the non-destructive methods available for lipid extraction from a cyanobacterium.

47. Explain the impact of hydraulic retention time on determining the microbial strain for waste treatment.

48. Explain the procedure involved in the industrial production of monosodium glutamate.

49. Write about the applications of amylase in the baking industry.

50. Describe the mechanistic role of bacteriocin as colonizing peptide.

———————

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M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Biotechnology

EMERGING TECHNOLOGIES

(CBCS – 2020 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (30 × 1 = 30)

Answer **all** questions.

1. NMR spectroscopy is based on

   (a) Diffraction (b) Radiation

   (c) Absorption (d) Emission

2. The principle of NMR spectroscopy

   (a) Nuclear fission

   (b) Nuclear fusion

   (c) Magnetic field of the nucleus

   (d) Charge of the nucleus

3. Which of the following microscope used to visualize a protein fused to an appropriate reporter in a living cell?

   (a) SEM

   (b) TEM

   (c) Darkfield

   (d) Fluorescence

4. In Gas Chromatography, the separation of the components of volatile materials is the difference in

   (a) Molarity

   (b) Molecular weight

   (c) Partition coefficient

   (d) Molality

5. The principle of confocal microscopy

   (a) Illumination and detection optics on the same diffraction-limited spot

   (b) Specimen illuminated with light of specific wavelength causing them to emit long wavelength

   (c) Eliminates scattered light from the sample image

   (d) Condenser lens concentrates a beam of visible light from the base on the specimen

6. Alexa Flour fluorescent dyes are

   (a) Positive charge

   (b) Negative charge

   (c) Neutral

   (d) Both positive and negative charge

7. Which of the following imaging techniques does not comes under fluorescence imaging technique?

   (a) FLIM (b) PALM

   (c) STORM (d) CCD imager

8. Two-photon microscopy used for

   (a) Live cell imaging

   (b) Dead cell imaging

   (c) Organ imaging

   (d) Tissue imaging

9. The life time of fluorophore

(a) Milliseconds

(b) Microseconds

(c) Femtoseconds

(d) Picosecond to hundreds of nanoseconds

10. Dark field microscopy ideally used to

(a) Illuminate unstained sample

(b) View fluorescent samples

(c) Image stained sample

(d) View acidic dyes

11. FT-ICR stands for

(a) Flow Transform -Ion Cycle Rate

(b) Final Transform -Ion Cyclotron Resonance

(c) Fourier Transform - Ion Cyclotron Resonance

(d) Femtogram Transform- Ion Cycle Rate

12. Mass Spectroscopy Imaging used to image

(a) Single molecule (b) Double molecule

(c) 10 molecules (d) Thousands of molecules

13. Which of the following analytical technique used to identify chemical substance by sorting of gaseous ions in electric and magnetic fields according to their mass-to-charge ratios?

(a) Raman spectroscopy

(b) Fluorescence correlative spectroscopy

(c) NMR spectroscopy

(d) Mass spectroscopy

14. What is phosphoproteome analysis?

(a) Determine glycolysation

(b) Determine protein phosphorylation

(c) Determine protein quantity

(d) Determine methylation

15. Atomic Force Microscopy developed to overcome basic drawback of

(a) TEM

(b) SEM

(c) Scanning Tunneling Microscopy

(d) Confocal

16. What does CRISPR stand for

(a) C is Regulated Interspaced Palindromic Repeats

(b) C Regulated lnterspaced Palindromic Sequence

(c) Clustered Regularly Interspaced Palindromic Sequence

(d) C is R Regularly Interspaced Palindromic Sequence

17. What are the possible outcomes following DNA cleavage by Cas9?

(a) Disruption of a gene

(b) Repair of a gene

(c) Deletion of the chromosome

(d) Disruption of more than one gene

18. CRISPR refers to the repeated sequences located in the

(a) Bacterial DNA (b) Viral DNA

(c) Viral RNA (d) guide RNA

19. The CRISPR sequences are recognized by

(a) Zinc finger domains

(b) TALEN

(c) guide RNA

(d) Leucine zipper

20. Tracer RNA refers to

(a) Trans activating CRISPR RNA

(b) Triple active CRISPR RNA

(c) Trail correct RNA

(d) Trio active CRISPR RNA

21. What is the name of the Llama produced nanobodies act against SARS-COV2-spike protein?

(a) Carmac (b) Cormac

(c) Badmac (d) Bormac

22. Nanobodies lack

(a) light chain

(b) heavy chain

(c) variable heavy chain

(d) hydrophilic side chain

23. Size of monovalent nanobody is

(a) 40-60 kDa (b) 70 kDa

(c) 2 kDa (d) 15 kDa

24. The important advantage of nanobody over antibody

(a) It can be aerosolized

(b) Suspension form

(c) Solid form

(d) Colloidal form

25. Nanobodies emerged from camelid

(a) lgG variant (b) IgA variant

(c) 1gM variant (d) IgE variant

26. Heavy chain antibodies can be obtained from

(a) Camelids (b) Mice

(c) Rat (d) Rabbit

27. SBW stands for

(a) Systems Biology Workbench

(b) Systems Biology Workflow

(c) Systems Biology Work

(d) Systems Biology Word

28. Omics refers to

(a) Large scale data

(b) Small scale data

(c) Specific data

(d) Single data

29. Which of the following does not comes under drug target?

(a) receptor

(b) carrier molecules

(c) Enzymes

(d) Serum

30. Which of the following is not the variant of BLAST?

(a) BLASTX (b) BLASTP

(c) BLASTN (d) TBLASTNX

Part B (10 × 2 = 20)

Answer any **ten** questions.

31. Write short notes on FLIM?

32. Write a abbreviation for the following terms: FLIM, FRET, FCS, STORM.

33. Define Phospho Proteomics

34. Mention a two applications of Mass Spectroscopy (MS) in structural biology.

35. Give the definition of Systems Biology?

36. What are the advantages of Atomic Force Microscopy?

37. Define Cryo-electron microscopy?

38. Who discovered CRISPR-Cas9 gene editing system?

39. Write about the classes of CRISPR-Cas9 system?

40. Define Nanobodies

41. How to identify Nanobodies?

42. Write a note on multiphoton microscopes?

Part C (5 × 5 = 25)

Answer any **five** questions.

43. Explain about advanced fluorescence imaging techniques?

44. Write down the advantages and disadvantages of confocal microscopy?

45. Give a short note on FT-ICR

46. Describe nano LC MS

47. Why model organisms are important in systems biology?

48. What are the various high throughput technologies used in systems biology and its importance?

49. CRISPR-Cas9 is a promising gene editing tool-justify.

50. Write briefly about Nanobodies?

———————

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M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Biotechnology

BIO ENTREPRENEURSHIP

(CBCS – 2020 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (30 × 1 = 30)

Answer **all** questions.

1. ———————— is a person who starts an enterprise

   (a) Sales person (b) employer

   (c) entrepreneur (d) Investor

2. _____are aggressive in nature who exhibit cleverness in putting attractive possibilities into practice.

   (a) Imitative Entrepreneur

   (b) Innovative Entrepreneur

   (c) Fabian Entrepreneurs

   (d) Drone Entrepreneurs

3. The ———————— who refuse to copy or use opportunities that come their way

   (a) Innovative Entrepreneur

   (b) Fabian Entrepreneurs

   (c) Drone Entrepreneurs

   (d) Imitative Entrepreneur

4. The MSME Development Act came into force in ————

(a) 2005 (b) 2006
(c) 2010 (d) 2001

5. ———————— founder of Biocon Limited and Biocon Biologics Limited, a biotechnology company based in Bangalore, India

(a) Lakshmi Niwas Mittal

(b) Kiran Mazumdar-Shaw

(c) Indira Nooyi

(d) Warren Buffett.

6. The _____ is often a scientist/researcher-turned-entrepreneur who wishes to see their research successes put into practice through commercialization.

(a) A manager (b) A professional
(c) Bio entrepreneur (d) A leader

7. ———————— help the entrepreneur to understand the market and produce goods or provide services in sync with the market trends

(a) A manager (b) Trend spotting
(c) Competition (d) demand

8. _____is the process of entrepreneurship which involves the translation of a useful idea into an application which has commercial value

(a) Innovation (b) Annual Turnover
(c) Complexity (d) Profit

9. The Micro, Small and Medium Enterprises (MSME) are classified on the basis of their

(a) Capital (b) Expenditure
(c) Production (d) Annual turnover

10. _____ are with welfare as primary and profit as secondary goals

(a) Private enterprises

(b) Public enterprises

(c) Joint enterprises

(d) Company

11. Which is not Public Sector Enterprises?

(a) Government companies

(b) Sole proprietorship

(c) Public corporations

(d) Departmental undertaking

12. _____ is a business model that describes the full range of activities needed to create a product or service.

(a) innovative idea

(b) discovery

(c) value chain

(d) product development

13. The enterprises which are owned, controlled, and managed by private individuals, with the main objective of earning profit comes under

(a) Government companies

(b) Departmental undertaking

(c) Public corporations

(d) Sole proprietorship

14. EDP (Entrepreneurship Development Programmes) is required to help:

(a) Existing entrepreneurs

(b) First generation entrepreneurs

(c) Future generations entrepreneurs

(d) None of the above

15. GST is an ———————— levied on the supply of goods and services

(a) Direct tax

(b) Indirect tax

(c) Income tax

(d) Gift tax

16. The commercialisation strategy of a biotech involves the decisions it makes about "what", "when" and "how" it will interact with its ————————

(a) Product (b) consumer

(c) Demand (d) value chain

17. A Medium Enterprise is an enterprise where investment in plant and machinery does not exceed (According to MSMED Act, 2018)

(a) ≤ Rs 5 crore

(b) > Rs 5 crore but below 75 crore

(c) Rs 10 crore

(d) <10 crore

18. Trademark ownership is usually acquired through use of a term or word or symbol to identify the origin of the goods or services.

(a) Use of a term (b) Use of a word

(c) Use of a symbol (d) (a), (b) and (c)

19. GST was passed by the Parliament on

(a) March 2017 (b) March 2019

(c) February, 2020 (d) July 2016

20. Blossoming entrepreneurs grow their business through

(a) selling

(b) offering capital

(c) product development

(d) start-up incubator

21. _____and _____of getting the product to market dealt by supply chain

(a) suppliers and logistics

(b) producer and mediator

(c) mediator and consumer

(d) none of the above

22. To make and encourage companies to develop, manufacture and assemble products made in India is an initiative referred as

(a) Start ups (b) Make in India

(c) Swasth Bharath (d) Clean India

23. _____is used to protect valuable proprietary information and is a commonly used form of protection for software.

(a) License (b) trade secrets

(c) accreditation (d) sole proprietorship

24. Right granted by the Government of a country to the inventor for a limited period of time is

(a) Geographical Indications

(b) patent

(c) invention

(d) monopoly

25. _____is adopted by an organization to identify its goods or services and distinguish them from those of the others

(a) advertisement (b) Trade mark

(c) audio – video aids (d) audio

26. NAAC accredits _____

(a) Programmes (b) Institution

(c) Society (d) Industry

27. _____ role is to set the quality benchmarks targeted at global and national stockpile of human capital in all fields of technical education

(a) NAAC (b) NBA

(c) GCP (d) GMP

28. Depending on how you address the negotiations, you will reach one of the following outcomes.

(a) win – win (b) win-lose

(c) lose – lose (d) (a) (b) and (c)

29. Choose the odd one which is not involve in implementation of rules and regulation related release of GMOs

(a) MoEFCC

(b) Department of Biotechnology (DBT)

(c) Department of Atomic energy

(d) Ministry of Science and Technology

30. _____ has advisory in function in rules and regulations related to release of GMOs

(a) Recombinant DNA Advisory Committee (RDAC)

(b) Institutional Biosafety Committee (IBSC)

(c) Review Committee on Genetic Manipulation (RCGM)

(d) Genetic Engineering Appraisal Committee (GEAC)

Part B $(10 \times 2 = 20)$

Answer any **ten** questions.

31. Can a patent application be filed after the invention has been published or exhibited?

32. What is difference between debt and stock, the two choice of raising capital?

33. Define Entrepreneurship

34. List out the different types of Biotechnology Industry.

35. List out and define three major financial statements

36. Write the concept and objectives of "Make in India".

37. Classify MSME based on its annual turnover.

38. Write the benefits of Geographical indications? Mention any two GI tag of Tamil Nadu.

39. Brief the role of DBT in developing entrepreneurship

40. Comment on technology transfer agencies.

41. What factors fill impact when you try raise capital?

42. Expand and explain CDSCO

Part C $(5 \times 5 = 25)$

Answer any **five** questions.

43. Discuss about strategies and operation protocol of bio sector firms

44. Describe about strategic dimensions of IPR and commercialization.

45. What is marketing? Discuss the strategies in marketing bio business?

46. Elaborate the various types of agreement and contract term of joint venturing.

47. Information technology play an inseparable role in Bio business- Defend

48. Understanding regulatory compliances and procedures are mandatory- Justify.

49. Discuss how you make link between Human Resources and Business Strategy

50. Describe about Entrepreneurship in the context of Biotechnology.

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M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Biotechnology

INTELLECTUAL PROPERTY RIGHTS, BIOSAFETY AND BIOETHICS

(CBCS – 2020 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (30 × 1 = 30)

Answer **all** questions.

1. Which country first filed patent for basmati rice?
   (a) China (b) Japan
   (c) Thailand (d) USA

2. First approved GM crop in India is
   (a) Bt Brinjal
   (b) Bt Cotton
   (c) Mustard
   (d) Potato

3. Word mark, logo, slogan, shapes are included under
   (a) patents
   (b) trademarks
   (c) copyrights
   (d) industrial design

4. One of the achievements of GATT was that of

(a) increasing quotas

(b) higher tariff rate

(c) trade partiality

(d) trade without discrimination

5. ———————— refers to scientific and technical information that exists prior to the effective date of a patent application.

(a) Geographical indication

(b) Trademark

(c) Litigation

(d) Prior art

6. The ———————— database provides access to International Patent Cooperation Treaty (PCT) applications in full text format on the day of publication, as well as to patent documents of participating national and regional patent offices

(a) CIPO

(b) PATENTSCOPE

(c) EKASWA

(d) INPADOC

7. WIPO administers ———————— treaties including the WIPO convention.

(a) 26 (b) 20

(c) 18 (d) 21

8. Which section of the Patents Act, 1970 deal with persons entitled to apply for patents?

(a) Section 5 of the Patent Act, 1970

(b) Section 6 of the Patents Act, 1970

(c) Section 8 of the Patents Act, 1970

(d) Section 20 of the Patents Act, 1970

9. Budapest treaty allows deposits of ———— at an international depositary to be recognized for the purpose of patent procedure.

(a) Plant

(b) Animals

(c) Microorganisms

(d) All of the above

10. A ———— is filed for claiming a priority date based on the same or substantially similar application filed in any of the convention countries.

(a) Non-provisional application

(b) Divisional application

(c) Convention application

(d) PCT application

11. Duration of a patent in India is

(a) 10 years

(b) 20 years

(c) 25 years

(d) 50 years

12. Ananda Chakraborty received the first U.S. patent for a GM entity. The entity was

(a) The GloFish

(b) Transgenic mouse expressing the growth hormone

(c) Genetically engineered *E. coli*

(d) *Pseudomonas* engineered to degrade petroleum

13. Which of the following is a GRAS organism?

(a) *Mycobacterium tuberculosis*

(b) *Vibrio cholerae*

(c) *Saccharomyces cerevisiae*

(d) *Clostridium botulinum*

14. An example for the organism which belong to Risk Group 4 is

(a) Simian Immunodeficiency Virus

(b) Ebola virus

(c) Epstein-Barr Virus

(d) Tobacco Mosaic Virus

15. Which of the following biotech company is responsible for majority of the GMOs in food supply?

(a) Bayer (b) Monsanto

(c) Abbott (d) Pfizer

16. ———————— is considered as a reasonable approach to identifying differences between novel foods and their traditional counterparts.

(a) Protection measure

(b) Safety protocol

(c) Risk assessment

(d) Substantial equivalence

17. TALENs stand for

(a) Transcription Activator-Like Effector Nucleases

(b) Transcription Activator-Like Enhancer Nucleases

(c) Translation Activator-Like Effector Nucleases

(d) Translation Activator-Like Enhancer Nucleases

18. Which of the following statements is true?

(a) Cisgenic products are completely safe due to absence of mutagenesis

(b) Unintended effects may be observed in Cisgenic products due to insertional mutagenesis

(c) Cisgenic products are completely harmful to the humans due to mutagenesis

(d) Point mutations does not lead to genetic aberration in Cisgenic products

19. ———————— established rules and procedures for the safe transfer, handling and use of LMOs.

(a) Codex Alimentarius

(b) Cartagena Protocol

(c) Environment Protection Act

(d) IBSC

20. OECD stands for

(a) Organization for Economic Collaboration and Development

(b) Organization for Economic Conservation and Development

(c) Organization for Environment Conservation and Development

(d) Organization for Economic Cooperation and Development

21. Which of the following is not a regulatory/approval authority?

(a) RCGM

(b) SBCC

(c) GEAC

(d) IBSC

22. Biotechnology Regulatory Authority of India regulates the ———————— related activities of biotechnology products.

(a) research

(b) transport

(c) containment

(d) all the above

23. Any plant or plant part that can be used to regenerate a whole plant under typical field conditions is termed

(a) Propagable

(b) Regenerative

(c) Degenerative

(d) Retrogressive

24. If the MRL of GM ingredients reaches one percent, food products need to display on the package that it contains GM food. Here, MRL denotes

(a) Minimum Range Limit

(b) Maximum Range Limit

(c) Maximum Residue Level

(d) Minimum Residue Level

25. Which of the following elements is not present in informed consent form?

(a) Confidentiality record

(b) Contact details

(c) Purpose of the study

(d) Children consent

26. Chorionic villus sampling is used in

(a) prenatal testing

(b) gene therapy

(c) transplantation

(d) cloning

27. Bt toxin disrupts lepidopteran's ———————— system.

(a) digestive

(b) nervous

(c) circulatory

(d) respiratory

28. Unauthorized appropriation and commercial exploitation of traditional knowledge of indigenous communities is called

(a) bioconservation

(b) biopiracy

(c) bioprospecting

(d) bioespionage

29. Which country produced first cloned buffalo?

(a) Uruguay

(b) Scotland

(c) India

(d) USA

30. Performing operation on living animal for physiological or pathological studies is known as

(a) dissection

(b) incision

(c) vivisection

(d) abscission

Part B (10 × 2 = 20)

Answer any **ten** questions.

31. What are geographical indications? Give two examples.

32. Define WIPO.

33. List the types of patent applications and mention their specifications.

34. Differentiate backward and forward IP.

35. What is the role of a Country Patent Office?

36. Draw a neat diagram of Class I Biological Safety Cabinet.

37. Define LMOs. Give two examples.

38. How cisgenic plants are produced? What are the risks to be assessed?

39. List the salient features of Cartagena protocol.

40. Classify the biosafety levels used for performing experiments.

41. Write the advantages of GE food.

42. How is euthanasia performed?

Part C (5 × 5 = 25)

Answer any FIVE questions.

43. Why was the Protection of Plant Varieties and Farmers' Rights Act enacted? Give its features.

44. Detail the international framework for the protection of IP.

45. How can patented innovations be commercialized?

46. Discuss in detail about the PCT and conventional patent applications.

47. Elaborate the principles of safety assessment of transgenic plants.

48. Give a brief account on environmental risk assessment and food and feed safety assessment.

49. Explain the framework of regulatory bodies for the approval of works involving genetically engineered microorganisms.

50. Why bioethics is of importance in human and animal experimentation?

———————

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M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022

Third Semester

Biotechnology

Lab VI – BIOPROCESS ENGINEERING AND TECHNOLOGY

(CBCS – 2020 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (30 × 1 = 30)

Answer **all** questions.

1. Preservation of intact living cells and tissue under sub-zero temperature conditions it known as

   (a) Cryopreservation (b) Acclimatization

   (c) Vernalization (d) Deep freezing

2. The light source is blocked off by patch stop, which causes the specimen to appear bright strained with a black background, this phenomenon is experienced in _____ microscope.

3. Sequential dilution of a culture to possibly obtain a single strain is known as _____ technique.

4. _____ is used as a fixative for Cell characterisation in electron microscope

   (a) formaldehyde (b) glutaraldehyde

   (c) osmium tetroxide (d) polyethylene glycol

5. _____ dye is used for lipid identification in microbe through confocal microscope.

(a) Coomassie brilliant blue

(b) Methylene blue

(c) Nile red

(d) Safranin

6. Among the following microbes, identify the microbe which doesn't belong to the soil ecosystem.

(a) fungi (b) actinomycetes

(c) phytoplankton (d) nematodes

7. Identify the correct formula for the Monod Kinetic model

(a) $\mu = \mu_{\max} S / K_s + S$

(b) $\mu = \mu_{\max} + S / K_s + S$

(c) $\mu = \mu_{\max} S / K_s - S$

(d) $\mu = \mu_{\max} + S / K_s - S$

8. Identify the optimum standard Parameter followed in wet or steam sterilization

(a) 121˚C, 5 psi, 30 minutes

(b) 121˚C, 5 psi, 15 minutes

(c) 121˚C, 15 psi, 30 minutes

(d) 121˚C, 15 psi, 45 minutes

9. In microbial growth curve, In which phase the reproduction of the microbe begins to stop, and media attains Microbial saturation

(a) Stationary phase

(b) Log phase

(c) Exponential phase

(d) Decline phase

10. Which of the following chemical is not a sterilizing agent

(a) Bromine water (b) Sodium Hypochlorite

(c) Silver Nitrate (d) Hydrogen Molybdate

11. _____ bioreactor is suitable for the cultivation of photosynthetic microalgae.

12. Considering the growth kinetics, the temperature above the optimal level _____ the growth rate of microorganism.

13. Which of the following solvent is not a polar solvent?

(a) Water (b) Dimethylformide(DMF)

(c) Chloroform (d) Acetic acid

14. FPLC stands for

(a) Fast protein liquid chromatography

(b) Fluid protein liquid chromatography

(c) Fast passage liquid chromatography

(d) Fluid proof liquid chromatography

15. The most commonly used carrier gas in gas chromatography is

(a) Oxygen (b) Neon

(c) Helium (d) Hydrogen

16. Estimation of protein can be done using _____ method.

(a) Phenol-Sulfuric acid

(b) Bicinchoninic acid method

(c) Sulfo-phosphoric acid method

(d) Stanford's method

17. Autoclavable plastics are made out of

(a) polyethene (b) Polypropylene

(c) polyvinyl chloride (d) Polystyrene

18. The machine used for amplify DNA Through polymerase chain reaction is known as _____.

19. Identify the significant macro elements required for the microbes to grow

(a) N, P, K, C, O, H (b) N, P, Mo, K, Mg, H

(c) P, K, C, O, Mg, H (d) N, P, K, H

20. The advanced form of batch fermenter system in which the sequentially aseptic addition of nutrient can be done if required, this system is known as _____.

21. Commercially used acetic acid for preservative purpose is named as _____.

22. Scanning electron microscope is used to observe

(a) shows a fluorescent image of the sample

(b) molecular details of the sample

(c) surface topography of the sample

(d) Cellular details of the sample

23. In HPLC, the mobile phase is delivered to a separation column, otherwise known as _____.

24. _____ unit recognizes the analytes after leaving the column in the HPLC.

25. _____ is a type of liquid chromatography that provides high resolution by small-diameter stationary phases for protein characterization and separation.

26. _____ are generally preferred as the carbohydrate sources rather than purified carbohydrates due to its affordability.

27. _____ is the test used to demonstrate the stability of a cell line for the production of recombinant protein by analyzing the size variation of protein and subunit mass.

28. A measure of the growth rate at any particular time was given by dividing the carbon dioxide production rate by _____.

29. _____ is used for the design of sterilization cycles avoiding the time-consuming graphical integrations.

30. Determination of oxygen-transfer rates in aerated vessels can be determined by the sulfite oxidation technique by determining the _____.

Part B $(10 \times 2 = 20)$

Answer any **ten** questions.

31. Describe the role of glycerol in cryopreservation.

32. Write about the process of agar slope preparation and its application.

33. Write the applications of the quadrant streaking plate method.

34. List out any two applications of the continuous perfusion system.

35. Define idiophase.

36. List out any two applications of laser scanning confocal microscope.

37. What are the applications of baffles?

38. Define fed-batch culture.

39. Define lyophilization.

40. Define *in vitro cell* age.

41. Define oxygen transfer rate.

42. Write the application of solid-phase microextraction.

Part C $(5 \times 5 = 25)$

Answer any **five** questions.

43. Explain the process of internal feedback system in continuous culture with a diagrammatic representation.

44. Describe the procedure of isolating the microbes from heavy metal contaminated soil sample.

45. Describe the working principle and components of UV-Vis spectrophotometer.

46. Describe the growth curve of typical microbial culture in batch conditions.

47. Explain the role of sigma factors that alter the gene expression under nutrient-depleted conditions.

48. Explain continuous fermentation with a schematic representation.

49. Write in detail about the cyclic fed-batch culture.

50. Explain the working principle and components of GC-MS.

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R7294	Sub. Code
	501309

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2022.

Third Semester

Biotechnology

LAB–VII : BIOINFORMATICS

(CBCS – 2020 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (30 × 1 = 30)

Answer **all** questions.

1. _____ section of the UNIPROT contains manually-annotated records with information extracted from literature and curator-evaluated computational analysis

   (a) UniProtKB/TrEMBL

   (b) UniProt Reference Clusters

   (c) UniProtKB/Swiss-Prot

   (d) UniProt Archive

2. NCBI's mission is to

   (a) develop efficient sequence alignment algorithms

   (b) develop structure alignment techniques

   (c) develop efficient software for performing pharmacophore studies

   (d) develop automated systems for storing and analyzing knowledge on Life science data

3. To find the required protein sequence information quickly, the user should enter the _____.

(a) sequence deposition date, protein name and journal name

(b) publication date, protein name, or volume

(c) sequence accession number, protein name, or name of gene

(d) properties, protein name, or title word

4. Which of the following databases is derived from mRNA information?

(a) dbEST (b) PBD

(c) OMIM (d) HTGS

5. GenBank is a part of the

(a) Protein Data Bank

(b) UniProt Knowledgebase

(c) International Nucleotide Sequence Database Collaboration

(d) Swiss Institute of Bioinformatics

6. To get the literature information, which of these below database is used?

(a) Lit-UniPROT (b) Entrez

(c) PubMed (d) Lit-EMBL

7. The default scoring matrix used in BLAST is

(a) PAM 250 (b) BLOSUM 90

(c) PAM 70 (d) BLOSUM 62

8. E-Value in BLAST is called as

(a) end score (b) expect value

(c) error value (d) alignment score

9. You have a DNA sequence. You want to know which protein in the main protein database ("nr." the non-redundant database) is most similar to some protein encoded by your DNA. Which program should you use?

(a) blastn (b) blastp

(c) blastx (d) tblastx

10. How can multiple sequence alignment programs improve performance?

(a) By performing PSI-BLAST

(b) By incorporating data on secondary structure

(c) By incorporating data on three-dimensional structures

(d) All of the above

11. The two main features of any phylogenetic tree are:

(a) The clades and the nodes

(b) The topology and the branch lengths

(c) The clades and the root

(d) The alignment and the bootstrap

12. You have two distantly related proteins. Which BLOSUM or PAM matrix is best to use to compare them?

(a) BLOSUM45 or PAM250

(b) BLOSUM45 or PAM10

(c) BLOSUM80 or PAM250

(d) BLOSUM80 or PAM10

13. Which one of tile following is a character-based phylogenetic algorithm?

(a) Neighbor joining (b) Maximum likelihood

(c) Kimura (d) PAUP

14. The Human Genome Project was carried out for a period of

(a) 25 years (b) 7 years

(c) 9 years (d) 13 years

15. The first complete genome of a living organism to be sequenced was:
    (a) *Haemophilus influenzae*
    (b) Saccharomyces cerevisiae chromosome III
    (c) ΦX174 bacteriophage
    (d) The human mitochondrial genome

16. Which are the most abundant RNA types?
    (a) rRNA and tRNA (b) rRNA and mRNA
    (c) tRNA and mRNA (d) mRNA and microRNA

17. Which one of the following is not the correct criterion for the primer design?
    (a) Length of the primer between 15 and 30 nucleotides
    (b) No self-complementary or complementary to other primers
    (c) >3 G/C nucleotide at the 3' end to avoid nonspecific priming
    (d) GC content (40–60%)

18. Which of the following is a RNA structure prediction tool
    (a) PSIPRED (b) DALI
    (c) Clustal Omega (d) mfold

19. SCOP and CATH are derived by using the protein structures of _____
    (a) UniPROT (b) Ensembl
    (c) InterPro (d) Protein Data Bank

20. The family level of the SCOP database has three-dimensional structures of closely related proteins with
    (a) a low RMSD value
    (b) a higher Z-score
    (c) a lower E-value
    (d) a clear evidence for their evolutionary origin

21. Which of the following is calculated, if more than three atoms are picked in PyMol?

(a) Bond length (b) Dihedral

(c) Distance (d) Bond angle

22. Homologous superfamily level of the CATH database groups together ————————.

(a) turn and loop regions

(b) side-chain information

(c) main-chain information

(d) protein domains

23. Which one of the following is the correct order of homology modeling steps?

(a) Template recognition, Alignment correction, Loop modeling, Backbone generation

(b) Template recognition, Side chain modeling, Loop modeling, Model optimization

(c) Template recognition, Backbone generation, Loop modeling, Side chain modeling

(d) Template recognition, Backbone generation, Side chain modeling, Loop modeling

24. Which one of the information is NOT needed for protein – small molecule docking method?

(a) Biological activity and functions

(b) Active site of the receptor

(c) Bond pattern and 3D structure of the ligand

(d) Feasibility of binding of a particular small molecule to that receptor, the knowledge gained from literatures

25. The Lipinski's rule of five is used for

(a) Docking (b) Similarity search

(c) Drug likeness (d) Dynamics simulation

26. The VAST, DALI and CE are very useful

(a) To accelerate the protein structure comparison

(b) To find alignments of coding region between human and puffer fish

(c) To analyze the input during phylogenetic analysis

(d) To compare small sequences

27. The goal of energy Minimization in protein structure simulation is to find

(a) active site region of protein structure

(b) conserved region of protein structure

(c) a set of coordinates representing the low energy conformation of the protein structure

(d) suitable small molecular compounds for docking

28. Which one of the following is a biological database, web resource of known and predicted protein–protein interactions and the retrieval of interacting genes/proteins?

(a) KEGG (b) MetaCyc

(c) Cytoscape (d) STRING

29. Which of the following is the database for miRNA target prediction and functional annotations?

(a) miRpred (b) rdb Pred

(c) miRDB (d) predMI

30. What are some of the properties of ultra-conserved elements?

(a) They have variable lengths (from 50 to > 1000 base pairs) and are nearly perfectly conserved

(b) They have variable lengths (from 50 to >1000 base pairs), are nearly perfectly conserved, and typically correspond to protein-coding regions

(c) They have lengths ≥ 200 base pairs and are perfectly or nearly perfectly conserved between relatively closely related species such as rats and mice

(d) They have lengths ≥ 200 base pairs and are perfectly or nearly perfectly conserved between relatively distantly related species such as humans and rodents

Part B $(10 \times 2 = 20)$

Answer any **ten** questions.

31. What are the two major classifications in UniprotKB?

32. Write the full form of GOLD and IMG/M genome databases?

33. Define E-value. Explain the use of E-value in BLAST.

34. Write about International Nucleotide Sequence Database Collaboration?

35. Define contig assembly.

36. Expand BLAST and give its uses.

37. Name any two gene prediction methods.

38. Why do we predict RNA structure?

39. The PSI-BLAST is more effective in detecting distantly related proteins than BLASTP – Justify.

40. How many steps are there in homology modeling?

41. What is the need for Grid Generation in AutoDock tool?

42. How many miRNAs are there in humans?

Part C $(5 \times 5 = 25)$

Answer any **five** questions.

43. Explain in detail about the hierarchial organization of UNIPROT database.

44. NCBI database is the major resource for bioinformatics research– Justify.

45. Discuss in detail about the BLAST tool with the significance of E-value and Z-score.

46. What are the applications of multiple sequence alignment?

47. Explain the following:

(a) Rooted tree (b) Unrooted tree, (c) Common ancestor, (d) Cladogram and (e) Phylogram

48. Write in detail about the steps involved in homology modeling.

49. Discuss the various levels of structural classification in the SCOP database.

50. Explain tile basic concept of designing and prediction of miRNA with its uses. List its software and tools.

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