

Nepal Engineering Council Registration Examination
Model Question for Biotechnology Engineering (ABtE)

Section A (60*1 = 60)

1. Which of the following is an example of a biotechnological product?
[Option]
 - a) A hammer
 - b) Antibiotics
 - c) A car engine
 - d) A smartphone

2. Which of the following events marked a major milestone in the history of genetic engineering and biotechnology?
[Option]
 - a) Discovery of penicillin by Alexander Fleming
 - b) The completion of the Human Genome Project
 - c) The development of the first computer
 - d) The invention of the smart devices

3. What area of biotechnology focuses on using microorganism to produce antibiotics and enzymes?
[Option]
 - a) Nanotechnology
 - b) Genetic engineering
 - c) Fermentation technology
 - d) Robotics

4. What is the primary product of *Saccharomyces cerevisiae* in brewing beer?
[Option]
 - a) Vinegar
 - b) Alcohol (ethanol)
 - c) Carbon dioxide
 - d) Lactic acid

5. What is the role of public perception in influencing the acceptance of biotechnological products and applications?
[Option]
 - a) It has no impact on the biotechnology industry
 - b) Public perception can significantly affect the success and adoption of biotechnological innovations.
 - c) Public perception is only relevant to the entertainment industry
 - d) Public perception is only important for political decisions.

6. What are intellectual property rights (IPR) in the context of biotechnology primarily concerned with?
[Option]
 - a) Protecting biological diversity in natural ecosystems
 - b) Safeguarding the confidentiality of research data
 - c) Protecting invention and innovations in the biotechnological field

- d) Restricting access to scientific knowledge
7. Which branch of biology focuses on the study of plant life, including their structure, growth, and reproduction?
[Option]
a) Zoology
b) Microbiology
c) Botany
d) Physiology
8. Which mineral is a crucial component of hemoglobin, the protein responsible for oxygen transportation in the blood?
[Option]
a) Iron
b) Calcium
c) Zinc
d) Potassium
9. _____ is the haploid and multicellular stage in the plant life cycle?
[Option]
a) Gametophyte
b) Sporophyte
c) Zygote
d) Embryo
10. The pentose phosphate pathway is important for the synthesis of
[Option]
a) Proteins
b) Fats
c) Nucleotides and pentose
d) Vitamins
11. Fatty acid synthesis is the process of creating fatty acids from acetyl-CoA and malonyl CoA. Which is responsible for this synthesis?
[Option]
a) DNA Polymerase
b) RNA Polymerase
c) Fatty acid synthase
d) Lipase
12. What is the term for the measurement of disorder or randomness in a thermodynamic system?
[Option]
a) Enthalpy
b) Entropy
c) Internal energy
d) Gibbs free energy
13. _____ is the process of separating and growing individual cells in a liquid medium?
[Option]
a) Embryogenesis
b) Somatic embryogenesis
c) Cell suspension culture
d) Totipotency

14. What is the primary objective of micro-propagation in plant biotechnology?
[Option]
- a) To genetically modified plants
 - b) To produce a large number of identical plants from a small piece of plant tissue
 - c) To create hybrid plants
 - d) To induce mutations in plant genomes
15. Somatic hybridization is a technique that involves
[Option]
- a) Fusion of gametes from different plants
 - b) Fusion of somatic cells from different plants
 - c) Growing plants from seeds
 - d) producing genetically identical cells
16. Which of the following is NOT a common method of obtaining haploid plants in plant biotechnology?
[Option]
- a) Anther culture
 - b) Ovule culture
 - c) Genetic engineering
 - d) Pollination
17. Which foreign gene transfer technique involves the use of tiny gold or tungsten particles coated with foreign DNA to shoot into plant cells?
[Option]
- a) Electroporation
 - b) Microinjection
 - c) Particle bombardment
 - d) Chloroplast transformation
18. Reporter genes are often used to
[Option]
- a) Report the latest news in plant biotechnology
 - b) Enhance plant resistance to pathogens
 - c) Monitor and identify the expression of foreign genes in plants
 - d) Accelerate plant growth
19. Which of the following is an essential component of most culture media, providing a carbon source for cell growth and development?
[Option]
- a) Serum
 - b) Glucose
 - c) Antibiotics
 - d) Salts
20. Hybridoma technology is a method used to produce
[Option]
- a) Recombinant DNA
 - b) Monoclonal antibodies
 - c) Vaccines
 - d) Therapeutic proteins

21. _____ was the first successfully cloned mammal using somatic cell nuclear transfer technique.
[Option]
a) Rabbit
b) Cow
c) Sheep (Dolly)
d) Chicken
22. In microcarrier culture, what are microcarriers made of?
[Option]
a) Synthetic materials
b) Animal tissues
c) Organic compounds
d) Water
23. Which biotechnological approach is used to develop animals with specific genes inserted into their DNA to produce desired traits or products?
[Option]
a) Cloning
b) Hybridization
c) Transgenesis
d) Inbreeding
24. Which vector system is commonly used in gene therapy to deliver genetic material into animal cells?
[Option]
a) Bacterial plasmids
b) Animal-derived proteins
c) Inhaled gases
d) Food supplements
25. What role does the development of industrial microorganisms play in the production of biofuels?
[Option]
a) It has no impact on biofuels production
b) It improves the taste and aroma of biofuels
c) It enhances the efficiency of biofuel production
d) It decreases the yield of biofuels
26. What is the primary purpose of metabolic feedback regulation in industrial microbial strains?
[Option]
a) To reduce the yield of desired products
b) To prevent the depletion of substrates
c) To inhibit all metabolic pathways
d) To maximize waste production
27. The enzyme amylase is primarily involved in the digestion of
[Option]
a) Proteins
b) Fats
c) Starch
d) Cellulose

28. What is the primary benefits of using recombinant DNA technology in the large scale production of metabolites?
[Option]
- a) Faster production
 - b) Enhanced flavor
 - c) Improved safety
 - d) The ability to engineer strains for higher yields
29. _____ is commonly used for the rapid identification of bacterial species based on genetic fingerprint?
[Option]
- a) Polymerase Chain Reaction
 - b) Western blotting
 - c) ELISA
 - d) Gram staining
30. Which technique is commonly used to analyze the genetic diversity of microbial communities in environmental samples?
[Option]
- a) Polymerase chain reaction (PCR)
 - b) Enzyme- linked immunosorbent assay (ELISA)
 - c) Mass spectrometry
 - d) Next-generation sequencing (NGS)
31. What is the primary role of dendritic cells in the immune system?
[Option]
- a) Produce antibiotics
 - b) Attack viruses directly
 - c) Present antigens to T cells for activation
 - d) Phagocytosis of bacteria
32. The process of inactivating or killing viruses on surfaces and in healthcare setting is known as:
[Option]
- a) Antiviral therapy
 - b) Sterilization
 - c) Disinfection
 - d) Immunization
33. What is a common side effect of chemotherapy, often referred to as “hair loss”?
[Option]
- a) Anemia
 - b) Cachexia
 - c) Alopecia
 - d) Leukemia
34. Biopharmaceuticals are typically derived from which source?
[Option]
- a) Synthetic materials
 - b) Microorganisms
 - c) Plants
 - d) Biological sources, such as proteins and antibodies

35. In IVF, the success rate is often measured by:
[Option]
- a) The age of female partner
 - b) The number of eggs produced
 - c) The number of embryos implanted
 - d) The live birth rate
36. Which of the following is not a potential application of stem cell therapy?
[Option]
- a) Treatment of heart disease
 - b) Repairing damaged spinal cords
 - c) Production of synthetic fuels
 - d) Regenerating damaged tissues and organs
37. Eutrophication of water bodies is often caused by an excess of which nutrient, leading to the overgrowth of algae and aquatic plant?
[Option]
- a) Nitrogen
 - b) Oxygen
 - c) Carbon dioxide
 - d) Phosphorus
38. In food chain, which trophic level typically has the highest energy content?
[Option]
- a) Primary consumers
 - b) Secondary consumers
 - c) Tertiary consumers
 - d) Producers
39. In industrial waste water treatment, which of the following is an example of primary treatment method?
[Option]
- a) Biological treatment
 - b) Advance oxidation
 - c) Physical separation process
 - d) Membrane filtration
40. The detection of heavy metals using microbial biosensors often relies on the ability of certain microorganisms to:
[Option]
- a) Produce biofuels
 - b) Accumulate or adsorb metals
 - c) Convert metals into non- toxic forms
 - d) Resist radiation
41. What type of bioremediation uses microorganism to break down or transform contaminants in soil or ground water?
[Option]
- a) Phytoextraction
 - b) Phytoremediation
 - c) Rhizofiltration
 - d) Bioaugmentation

42. Which term describes the use of genetically engineered microorganisms to remove or transform pollutants in the environment?
[Option]
- a) Greenwashing
 - b) Genetic modification
 - c) Bioprocessing
 - d) Biotechnology-mediated bioremediation
43. What is the primary advantage of using immobilized enzymes in bioprocess?
[Option]
- a) Lower enzyme activity
 - b) Increased enzyme stability and reusability
 - c) Faster enzyme denaturation
 - d) Reduced enzyme specificity
44. The term “dilution rate” is most commonly associated with which type of bioprocess?
[Option]
- a) Batch
 - b) Fed-batch
 - c) Continuous
 - d) Semi-batch
45. Which of the following sterilization methods is suitable for heat sensitive components in culture media?
[Option]
- a) Autoclaving
 - b) UV irradiation
 - c) Filtration
 - d) Boiling
46. Ultrafiltration is primarily used for the separation of particles based on their:
[Option]
- a) Size
 - b) Charge
 - c) Density
 - d) Hydrophobicity
47. Which valve type is often used in bioprocess where a high flow rate needs to be controlled rapidly?
[Option]
- a) Globe valve
 - b) Ball valve
 - c) Gate valve
 - d) Butterfly valve
48. What does “tuning” of a controller refer to in process control?
[Option]
- a) Adjusting the controller’s parameters to optimize its performance
 - b) Fine –tuning the measurement devices
 - c) Calibrating the actuator
 - d) Switching between feedback and feedforward control

49. Which of the following is a characteristic feature of a good expression vector?
[Option]
- a) Lack of promotor
 - b) Inability to replicate
 - c) High copy number
 - d) Inability to carry large DNA inserts
50. What is the primary purpose of a selectable marker?
[Option]
- a) To select cells that have taken up the recombinant DNA
 - b) To isolate DNA from bacterial cells
 - c) To amplify the target gene
 - d) To express the gene of interest
51. What is the purpose of gene integration in recombinant DNA technology?
[Option]
- a) To remove a specific gene from a host organism
 - b) To insert a foreign gene into a host genome
 - c) To inhibit gene expression
 - d) To clone a gene in a vector
52. Gene transfer technologies, such as electroporation and lipofection, are used to:
[Option]
- a) Sequence DNA
 - b) Isolate proteins
 - c) Introduce foreign DNA into host cells
 - d) Amplify RNA
53. Which component of a cell or tissue is typically labeled with a fluorescent tag in fluorescent microscopy?
[Option]
- a) Nucleus
 - b) Cytoplasm
 - c) Cell membrane
 - d) DNA
54. Which of the following is an example of a widely used sequence database that stores DNA and protein sequences from various organisms?
[Option]
- a) BLAST
 - b) GenBank
 - c) PCR
 - d) Southern blot
55. Standard dimensions (mm x mm) of A3 drawing sheet is
- a) 11.69 × 16.54
 - b) 29.7 × 42
 - c) 297 × 420
 - d) 420 × 280

56. Which of the following methods of charging depreciation of an asset has increased amount of depreciation as the age of asset increases
- a) sum-of-year digit
 - b) sinking fund
 - c) diminishing balance
 - d) straight line
57. The process of optimizing the project's limited resources without extending the project duration is known as
- a) project crashing
 - b) resource levelling
 - c) resource smoothing
 - d) networking
58. The process of composing/raising the required fund from different sources such as equity, preferred stock, bond and debenture is known as
- a) capital structure planning
 - b) project financing
 - c) capital budgeting decision
 - d) deducing earning per share
59. In which of the following society, people used to seek their existence on growing plants for their cattle and domestic animals
- a) pastoral society
 - b) tribal society
 - c) horticultural society
 - d) agricultural society
60. According to Nepal Engineering Council Act, 2055 (Revised, 2079), all engineering academic institutions shall be in the Council.
- a) affiliated
 - b) united
 - c) recognized
 - d) associated

Section-B (20*2 = 40)

61. Which of the following statements is true about the history of biotechnology?
[Option]
- a) Biotechnology is a recent scientific field with little historical background
 - b) Biotechnology has been practiced for thousand years
 - c) Biotechnology was originated in 20th century with the discovery of DNA
 - d) Biotechnology was first developed in the 18th century

62. What is the term for potential risks associated with biotechnology, such as unintended consequences or environmental damage?
[Option]
- a) Biosecurity
 - b) Biopiracy
 - c) Bioprospecting
 - d) Biophilia
63. What type of biomolecule are enzymes primarily?
[Option]
- a) Carbohydrates
 - b) Nucleic acids
 - c) Proteins
 - d) Vitamins
64. The “breakdown” of biomolecules to release energy is known as
[Option]
- a) Anabolism
 - b) Fermentation
 - c) Catabolism
 - d) Glycolysis
65. _____ is the cause of somaclonal variations in tissue-cultured plant.
[Option]
- a) Genetic mutation
 - b) Exposure to radiation
 - c) Pathogen infections
 - d) Changes in the culture medium
66. _____ is a well-known secondary metabolite produced by plants with medicinal properties?
[Option]
- a) Glucose
 - b) Starch
 - c) Alkaloid
 - d) Cellulose
67. What is a key challenge in the production of secondary metabolites in plants?
[Option]
- a) Insufficient light exposure
 - b) Insufficient nutrition absorption
 - c) Low metabolic activity
 - d) Obtaining high yields of desired compounds
68. Macrocarrier culture is often used for
[Option]
- a) Culturing animal cells in a large –scale industrial setting
 - b) Miniaturizing bioreactors
 - c) Growing animals to a macroscopic size
 - d) Regenerating tissues in animals

69. The regulatory mechanism of metabolic pathways in industrial strains ensure
[Option]
- a) Slow metabolic processes
 - b) Efficient utilization of substrate and product formation
 - c) Random genetic mutations
 - d) No metabolic activity in the microorganism
70. Metagenomics is a screening strategy that involves
[Option]
- a) Analyzing the genetic material from a single microorganism
 - b) Studying the genes of an entire microbial community
 - c) Isolating individual genes from microorganisms
 - d) Producing antibiotics
71. Immunoglobulins, also known as antibodies, are produced by:
[Option]
- a) Red blood cells
 - b) White blood cells
 - c) The liver
 - d) The digestive system
72. Lead compounds in drug discovery refers to:
[Option]
- a) The first group of patients tested with a new drug
 - b) Potential drug candidates with promising biological activity
 - c) Microorganism used for drug production
 - d) The final stage of clinical trials
73. In waste water treatment, BOD stands for:
[Option]
- a) Biological Oxygen Demand
 - b) Basic Organic Decomposition
 - c) Biological Organic Detoxification
 - d) Bacterial Oxygen Depletion
74. Environmental Impact Assessment (EIA) is a process used for?
[Option]
- a) Asses the economic impact of environmental projects
 - b) Identify and evaluate the potential effects of a proposed project
 - c) Determine the potential effects of environmental policies on the economy
 - d) Assess the environmental impact of noise pollution
75. Which of the following is not typically considered a mode of bioprocess operation?
[Option]
- a) Batch
 - b) Fed-batch
 - c) Discrete
 - d) Continuous
76. Which component of a PID controller adjusts the control output based on the difference between the desired set point and the process variable?
[Option]
- a) Proportional
 - b) Integral
 - c) Derivative

d) Feedback control

77. The first Human hormone product by Recombinant DNA technology is

[Option]

- a) Insulin
- b) Thyroxine
- c) Estrogen
- d) Progesterone

78. Each Restriction enzyme cleaves a DNA molecule only at:

[Option]

- a) the ends of genes
- b) methyl groups
- c) specific nucleotide
- d) center of DNA molecule

79. Effective monthly interest rate will be, if nominal interest rate of 10% accounted for continuous compounding

- a) 1%
- b) 0.84%
- c) 1.2%
- d) 2%

80. By considering following activities of a project, the project duration will be

Activity	A	B	C	D	E
Immediate predecessors	-	-	-	C	A, B, D
Duration (days)	4	5	3	7	5

- a) 9 days
- b) 10 days
- c) 15 days
- d) 24 days