國立中山大學114學年度
碩士班考試入學招生考試試題

科目名稱：科技英文【精準所碩士班、生藥所碩士班、生醫所碩士班、醫科所碩士班甲組、乙組、生醫科學與工程領域聯合碩士班】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張（應考證不得做計算紙書寫）、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

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※本科目依簡章規定「不可以」使用計算機(選擇題)

Multiple-Choice Questions (單選題)；Total 40 questions, 2.5 points per question, and no additional deduction is applied to each incorrect answer.

1. Which of the following best describes the function of a spectrophotometer in biotechnology?
(A) Amplifying DNA samples
(B) Measuring the absorbance of light by a solution
(C) Detecting protein-protein interactions
(D) Visualizing cells in real-time

2. Which of the following techniques is used to edit genes at specific locations in the genome?
(A) Western Blotting
(B) CRISPR-Cas9
(C) Flow Cytometry
(D) ELISA

3. In PCR (Polymerase Chain Reaction), which enzyme is responsible for amplifying the DNA?
(A) DNA polymerase
(B) RNA polymerase
(C) Reverse transcriptase
(D) Helicase

4. Which of the following describes the main advantage of next-generation sequencing (NGS)?
(A) It allows for large-scale DNA sequencing at high speed and low cost
(B) It detects protein interactions within cells
(C) It amplifies RNA sequences
(D) It is used for cloning genes into vectors

5. Which of the following is the correct order of the steps in gene expression?
(A) Transcription → Translation → Replication
(B) Translation → Transcription → Replication
(C) Replication → Transcription → Translation
(D) Transcription → Translation → DNA Repair

6. Which of the following best describes the principle of fluorescence microscopy in medical technology?
(A) It uses radioactive isotopes to detect cellular structures
(B) It detects light emitted by fluorescent molecules within cells
(C) It measures electrical activity in living cells
(D) It visualizes cells using sound waves

7. Which of the following is a major application of flow cytometry in medical diagnostics?
(A) Measuring the genetic sequence of DNA
(B) Separating proteins from complex mixtures
(C) Analyzing the physical and chemical properties of cells
(D) Detecting hormone levels in the bloodstream

8. Which of the following describes the role of reverse transcriptase in biotechnology?
(A) It synthesizes RNA from a DNA template
(B) It synthesizes DNA from an RNA template

(C) It breaks down proteins in cells
(D) It repairs damaged DNA

9. In gene therapy, the primary goal is to:
(A) Replace defective genes with functional ones
(B) Silence harmful proteins produced by cells
(C) Amplify DNA sequences for further study
(D) Analyze mutations in RNA

10. What is the primary purpose of a Western Blot in medical research?
(A) To separate proteins based on size and detect specific proteins
(B) To amplify specific sequences of DNA
(C) To measure the concentration of antibodies in a sample
(D) To sequence the entire human genome

11. Which of the following organelles is found in plant cells, but not in animal cells
(A) chloroplast
(B) Golgi apparatus
(C) mitochondrion
(D) smooth endoplasmic reticulum

12. _____ are attached to hnRNAs and mRNAs after transcription has been completed and is essential for efficient translation and stability of the mRNAs.
(A) exons
(B) entrons
(C) poly(A) tails
(D) poly(U) tails

13. Which of the following bases is found only in DNA?.
(A) adenine
(B) thymine
(C) uracil
(D) cytosine

14. Which of the following techniques was used to determine the double helical structure of DNA?
(A) IR spectroscopy
(B) X-ray diffraction
(C) Raman spectroscopy
(D) UV/Vis spectroscopy

15. Which of the following is the most commonly observed nucleic acid form for storing of genomic information?
(A) single-stranded DNA
(B) double-stranded DNA
(C) double-stranded RNA
(D) hybrid molecules of DNA and RNA

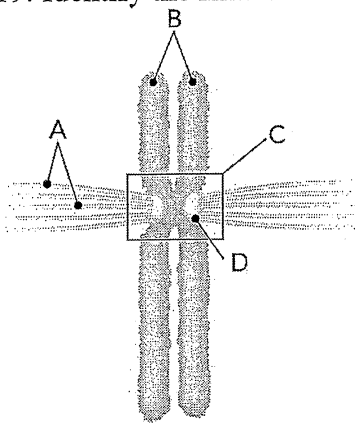
16. In the sequence of cytochrome c, the presence of cysteine at position 17 in hundreds of different species indicates that this particular amino acid is

(A) conserved
(B) mutated
(C) homologous
(D) variable

17. Several histones can bind to one DNA molecule, forming a repeating unit called a
(A) ribozyme.
(B) nucleosome.
(C) topoisomerase.
(D) nucleoside.

18. Chromatin that consists of more condensed regions of mostly noncoding DNA are referred to as
(A) nucleosomes.
(B) histones.
(C) heterochromatin.
(D) euchromatin.

19. Identify the kinetochore in the following figure.



(A) A
(B) B
(C) C
(D) D

20. In a single RNA transcript, polycistronic prokaryotic genes encode_____protein(s).
(A) one.
(B) two.
(C) three.
(D) multiple

21. Which process describes the conversion of glucose to pyruvate in cellular respiration?
(A) Glycolysis
(B) Krebs Cycle
(C) Oxidative Phosphorylation
(D) Calvin Cycle

22. Which of the following structures is primarily responsible for protein synthesis?
(A) Ribosome
(B) Lysosome

(C) Nucleus
(D) Mitochondrion

23. What term describes the process by which a cell engulfs large particles or other cells?
(A) Pinocytosis
(B) Phagocytosis
(C) Apoptosis
(D) Exocytosis

24. Which of the following is NOT a component of the central dogma of molecular biology?
(A) DNA replication
(B) RNA transcription
(C) Protein translation
(D) Reverse transcription

25. Which of the following techniques is commonly used for amplifying DNA in molecular biology?
(A) Western Blot
(B) Polymerase Chain Reaction (PCR)
(C) ELISA
(D) Gel Electrophoresis

26. Which of the following genes is commonly known as a tumor suppressor gene and is often mutated in cancer?
(A) KRAS
(B) BRCA1
(C) EGFR
(D) p53

27. Which process allows cancer cells to invade neighboring tissues and spread to distant sites in the body?
(A) Angiogenesis
(B) Metastasis
(C) Apoptosis
(D) Differentiation

28. Which type of vaccine uses a weakened form of the pathogen to stimulate an immune response?
(A) Inactivated Vaccine
(B) Live Attenuated Vaccine
(C) mRNA Vaccine
(D) Subunit Vaccine

29. Which of the following describes the primary mechanism of action of mRNA vaccines, such as those used for COVID-19?
(A) Introducing a weakened pathogen
(B) Delivering a small piece of genetic material to produce viral proteins
(C) Using a killed virus to elicit an immune response
(D) Introducing virus-like particles (VLPs)

30. Which phase of clinical drug trials focuses primarily on evaluating a drug's safety and determining a safe dosage range?
(A) Phase I
(B) Phase II
(C) Phase III
(D) Phase IV

31. Which is the main goal of precision medicine?
(A) Providing identical treatment to all patients
(B) Developing new surgical techniques
(C) Tailoring treatment based on individual patient characteristics
(D) Eliminating all genetic diseases

32. Which of the following is NOT an "omics" field in precision medicine?
(A) Genomics
(B) Proteomics
(C) Hydraulics
(D) Metabolomics

33. Which type of cancer treatment is tailored using biomarkers like HER2?
(A) Chemotherapy
(B) Targeted therapy
(C) Surgery
(D) Radiotherapy

34. Which of the following techniques is commonly used to sequence DNA for precision medicine?
(A) Mass spectrometry
(B) RNA-seq
(C) Next-generation sequencing (NGS)
(D) Immunohistochemistry

35. PD-L1 expression is a biomarker for:
(A) Resistance to chemotherapy
(B) Response to immune checkpoint inhibitors
(C) Tumor growth rate
(D) Gene editing feasibility

36. Which receptor is considered important for targeted therapy in non-small cell lung cancer (NSCLC)?
(A) GPCR
(B) EGFR
(C) TLR
(D) ER

37. Liquid biopsy is used for:
(A) Surgical removal of tumors
(B) Non-invasive detection of circulating tumor DNA (ctDNA)
(C) RNA extraction from tissues
(D) Screening for rare genetic diseases

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38. What is CRISPR primarily used for in precision medicine?
(A) Protein detection
(B) Genome editing
(C) Imaging cells
(D) Cell sorting

39. Single-cell RNA sequencing is valuable in precision medicine because it:
(A) Generates genetic risk scores
(B) Monitors drug levels in blood
(C) Sequences circulating tumor DNA
(D) Detects heterogeneity within tumors

40. What is the first FDA-approved CRISPR/Cas9 therapy?
(A) Sickle Cell Disease (SCD)
(B) Non-small cell lung cancer (NSCLC)
(C) Triple-negative breast cancer (TNBC)
(D) Glioblastoma (GBM)