Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Microbiology) (Fourth Semester) EXAMINATION, 2025-26

(New Syllabus Effective from 2023)

PHARMACEUTICAL MICROBIOLOGY

Paper Code								
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Questions Booklet Series
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Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

(Only for Rough Work)

1. During drug development, compounds proven safe are tested in patients for therapeutic efficacy; this phase is :

(A) Phase I

(B) Phase II

(C) Phase III

(D) Phase IV

2. Which physicochemical factor most significantly influences microbial growth in pharmaceutical formulations and preparations ?

(A) Drug potency

(B) Drug metabolism

(C) Molecular weight

(D) Water activity

3. Combinatorial chemistry techniques are widely used in drug discovery to generate :

(A) Single compound

(B) Diverse compound libraries

(C) Enzymes only

(D) Purified drugs

4. Which sterilization technique is most suitable for heat-sensitive medical instruments and plastic materials ?

(A) Dry heat sterilization

(B) UV radiation

(C) Ethylene oxide gas

(D) Membrane filtration

5. A drug having a high therapeutic index indicates which important pharmacological property ?

(A) High toxicity

(B) Low efficacy

(C) Narrow safety margin

(D) Wide safety margin

6. Antibiotic resistance developed due to alteration of drug binding sites is called :

(A) Efflux mechanism

(B) Enzymatic degradation

(C) Target modification

(D) Reduced permeability

7. High-throughput screening techniques are useful in drug discovery for rapidly analyzing :

(A) Few compounds

(B) Limited samples

(C) Large compound libraries

(D) Storage materials

8. Which process ensures removal of pyrogens from pharmaceutical preparations ?

(A) Sterilization

(B) Filtration

(C) Distillation

(D) Depyrogenation

9. Presence of microbial contamination in pharmaceutical products generally results in :

(A) Increased stability

(B) Improved purity

(C) Product degradation

(D) Enhanced activity

10. Integration of viral genome into host DNA without immediate lysis occurs in :

(A) Lytic cycle

(B) Budding mechanism

(C) Binary fission

(D) Lysogenic cycle

11. An ideal pharmaceutical preservative must be chemically compatible with formulation components and must be :

(A) Highly volatile

(B) Strong smelling

(C) Stable and effective

(D) Highly reactive

12. Identification of drug targets using computational biology mainly relies on which method ?

(A) Fermentation techniques

(B) Wet lab experiments

(C) Data mining approaches

(D) Drug purification

13. Drug regulatory authorities approve drugs after evaluating their quality, safety, and :

(A) Storage capacity

(B) Marketing potential

(C) Export ability

(D) Clinical efficacy

14. Alkaloids synthesized by plants are classified under which category of metabolites ?

(A) Secondary metabolites

(B) Primary metabolites

(C) Structural proteins

(D) Lipid compounds

15. Which factor most significantly affects preservative partitioning between aqueous and oil phases in emulsions ?

(A) pH

(B) Partition coefficient

(C) Temperature

(D) Viscosity

16. Antibiotic resistance caused by active efflux of drugs from microbial cells is known as :

(A) Mutation

(B) Efflux mechanism

(C) DNA repair

(D) Drug activation

17. Study of genetic variations influencing drug response among individuals is called :

(A) Pharmacokinetics

(B) Pharmacodynamics

(C) Pharmacogenomics

(D) Toxicology

18. Preservative challenge test in pharmaceutical formulations is used to evaluate :

(A) Toxicity profile

(B) Chemical stability

(C) Antimicrobial efficacy

(D) Solubility pattern

19. Gamma radiation sterilizes pharmaceutical materials primarily by causing which cellular damage ?

(A) DNA strand breaks

(B) Membrane disruption

(C) Protein denaturation

(D) Enzyme activation

20. Rational drug design strategies are primarily based on structural understanding of :

(A) Random molecules

(B) Trial methods

(C) Biological targets

(D) Chemical reactions

21. Which bioinformatics approach is used to predict protein structure for drug design ?

(A) Homology modeling

(B) Molecular docking

(C) Sequence alignment

(D) Phylogenetic analysis

22. Which advanced drug delivery system utilizes ligand-receptor interactions for site- specific targeting ?

(A) Liposomes

(B) Nanoparticles

(C) Targeted drug delivery systems

(D) Microspheres

23. Standards for pharmaceutical drugs in India are officially provided by which authority ?

(A) USP

(B) BP

(C) WHO

(D) IP

24. Effectiveness of preservatives in pharmaceutical products depends on which combination of factors ?

(A) Multiple environmental factors

(B) Pressure only

(C) Light only

(D) Size only

25. Antimicrobial peptides are important components of which type of immune defense system ?
(A) Adaptive immunity
(B) Passive immunity
(C) Innate immunity
(D) Artificial immunity

26. Preclinical evaluation of new drugs is generally carried out using which experimental models ?
(A) Humans
(B) Machines
(C) Plants
(D) Animals

27. Semi-synthetic antibiotics are chemically modified derivatives of natural antibiotics to improve :
(A) Pharmacological properties
(B) Toxicity
(C) Stability loss
(D) Inactivity

28. β- lactam antibiotics exert antibacterial action by inhibiting synthesis of which structure ?
(A) DNA
(B) Proteins
(C) Cell wall
(D) Lipids

29. Biosensors are analytical tools commonly used in diagnostics for detection of :
(A) Biological analytes
(B) Storage elements
(C) Packaging materials
(D) Synthetic drugs

30. Combinatorial synthesis methods are useful for generating large numbers of compounds for :
(A) Storage
(B) Limited testing
(C) Protein analysis
(D) Drug screening

31. Plasmid-mediated antibiotic resistance spreads among bacteria primarily through which mechanism ?
(A) Horizontal gene transfer
(B) Ribosomal alteration
(C) Chromosomal mutation
(D) Protein synthesis

32. Ultraviolet radiation is mainly used in laboratories for which sterilization purpose ?
(A) Deep sterilization
(B) Surface sterilization
(C) Gas sterilization
(D) Chemical sterilization

33. An effective preservative system in pharmaceutical products must ensure both stability and :
(A) Taste
(B) Odor
(C) Color
(D) Antimicrobial efficacy

34. Phage therapy involves use of which type of bacteriophages to kill bacterial cells ?
(A) RNA viruses
(B) Temperate phages
(C) Lytic bacteriophages
(D) Retroviruses

35. Which parameter is most critical in determining the lethality of a sterilization process when comparing different microorganisms ?

(A) Thermal conductivity

(B) Z-value

(C) D-value

(D) F_0 value

36. Major sources of microbial contamination in pharmaceutical industries arise from :

(A) Single source

(B) Only air

(C) Only water

(D) Multiple sources

37. The British Pharmacopoeia is an official drug standard reference associated with which country ?

(A) USA

(B) India

(C) WHO

(D) United Kingdom

38. Azole antifungal drugs act by inhibiting synthesis of which essential fungal component ?

(A) DNA

(B) Cell wall

(C) Proteins

(D) Ergosterol

39. The first crucial step in the modern drug discovery process involves identification of :

(A) Biological targets

(B) Packaging methods

(C) Market demand

(D) Distribution channels

40. Which mechanism best explains resistance to β-lactam antibiotics mediated by extended-spectrum β-lactamases (ESBLs) ?

(A) Efflux pumps

(B) Hydrolysis of β-lactam ring

(C) Reduced permeability

(D) Ribosomal mutation

41. Antiviral drugs specifically interfere with which processes occurring in viral replication cycles ?

(A) Bacterial metabolism

(B) Viral replication

(C) Fungal growth

(D) Protozoan metabolism

42. Development of resistance against preservatives leads to which undesirable pharmaceutical outcome ?

(A) Reduced effectiveness

(B) No change

(C) Increased activity

(D) Complete elimination

43. Drug reimbursement policies in healthcare systems mainly relate to coverage of :

(A) Storage costs

(B) Testing costs

(C) Manufacturing costs

(D) Treatment expenses

44. Antibiotics interfering with DNA replication target which cellular component in microbes ?

(A) Ribosomes

(B) Lipids

(C) Cell wall

(D) Nucleic acids

45. Clinical trials are systematically conducted to evaluate drug safety, efficacy, and overall :

(A) Packaging

(B) Storage

(C) Therapeutic performance

(D) Marketing

46. Natural plant-derived compounds are valuable in drug discovery mainly due to their :

(A) Structural diversity

(B) Synthetic origin

(C) Protein nature

(D) Lipid content

47. Stability of pharmaceutical drugs is influenced by environmental factors such as temperature, light, and :

(A) Pressure only

(B) Humidity

(C) Size

(D) Shape

48. Major cause of increasing antimicrobial resistance worldwide is primarily due to :

(A) Proper usage

(B) Controlled therapy

(C) Limited exposure

(D) Misuse of antibiotics

49. Biosensors are commonly used for real-time monitoring and detection of biological :

(A) Storage materials

(B) Analytes

(C) Packaging

(D) Synthesis

50. Genomics contributes significantly to modern drug discovery by enabling efficient :

(A) Random screening

(B) Traditional methods

(C) Fermentation

(D) Target identification

51. Selective toxicity of antibiotics is achieved due to differences between host and microbial :

(A) Targets
(B) Storage systems
(C) Transport
(D) Metabolism

52. In pharmacokinetics, which compartment model assumes instantaneous distribution of drug throughout the body ?

(A) Two-compartment model
(B) Multi-compartment model
(C) One-compartment model
(D) Non-linear model

53. Fluoroquinolone antibiotics act by inhibiting which enzyme essential for bacterial DNA replication ?

(A) RNA polymerase
(B) DNA ligase
(C) DNA gyrase
(D) Topoisomerase I

54. Antifungal drugs commonly target ergosterol, which is an essential component of fungal :

(A) Cell membrane
(B) RNA
(C) DNA
(D) Cell wall

55. Incomplete antibiotic treatment regimens often lead to development of which clinical problem ?

(A) Cure
(B) Stability
(C) Enhancement
(D) Resistance

56. Uptake of free naked DNA by bacterial cells from environment is termed :

(A) Conjugation
(B) Transduction
(C) Mutation
(D) Transformation

57. Transfer of genetic material via bacteriophages from one bacterium to another is called :

(A) Conjugation
(B) Transformation
(C) Mutation
(D) Transduction

58. Antimicrobial peptides exert their action mainly by disrupting microbial cell in :

(A) DNA
(B) Membrane
(C) Protein synthesis
(D) Lipid synthesis

59. Phage therapy is considered highly specific because bacteriophages target specific :
(A) Organs
(B) Cells
(C) Hosts
(D) Molecules

60. Lytic cycle of bacteriophages results in replication of virus followed by :
(A) Integration
(B) Latency
(C) Persistence
(D) Host cell lysis

61. Steam sterilization using autoclave is based on application of moist heat under :
(A) Low pressure
(B) Vacuum
(C) High pressure
(D) Atmospheric pressure

62. D-value in sterilization kinetics represents time required to reduce microbial population by :
(A) 50%
(B) 90%
(C) 99%
(D) 100%

63. Microbial spoilage of pharmaceutical products results in degradation and loss of :
(A) Color
(B) Activity
(C) Weight
(D) Volume

64. Membrane filtration sterilizes solutions by physically removing microorganisms based on :
(A) Charge
(B) Size exclusion
(C) Shape
(D) Color

65. Ethylene oxide gas sterilization kills microorganisms mainly through alkylation of :
(A) Proteins
(B) DNA and proteins
(C) Lipids
(D) Carbohydrates

66. In antimicrobial susceptibility testing, which method provides quantitative measurement of drug concentration required to inhibit growth ?
(A) Disc diffusion
(B) MIC determination
(C) Gram staining
(D) Turbidity test

67. Preservative activity in pharmaceutical formulations is influenced by concentration, pH, and :
(A) Shape
(B) Size
(C) Temperature
(D) Color

68. Which parameter is used to measure the safety margin of a drug quantitatively ?
(A) ED50
(B) LD50
(C) Therapeutic index
(D) Bioavailability

69. Which component of lipopolysaccharide (LPS) is primarily responsible for endotoxin activity in Gram-negative bacteria ?

(A) O-antigen
(B) Core polysaccharide
(C) Lipid A
(D) Peptidoglycan

70. Failure of preservative system in pharmaceutical products leads to undesirable microbial :

(A) Reduction
(B) Stability
(C) Growth
(D) Removal

71. Which parameter defines the relationship between drug concentration and its pharmacological effect ?

(A) Pharmacokinetics
(B) Clearance
(C) Bioavailability
(D) Pharmacodynamics

72. Structure-activity relationship studies help in optimizing chemical structures for improved drug :

(A) Storage
(B) Activity
(C) Color
(D) Taste

73. Phase III clinical trials are conducted on large populations to confirm drug efficacy and :

(A) Toxicity only
(B) Safety
(C) Cost
(D) Packaging

74. ED50 value of a drug represents the dose required to produce desired effect in :

(A) 10% population
(B) 25% population
(C) 50% population
(D) 100% population

75. Pharmacokinetics deals with absorption, distribution, metabolism, and excretion of :

(A) Drugs
(B) Nutrients
(C) Enzymes
(D) Hormones

76. Regulatory agencies play crucial roles in ensuring quality, safety, and efficacy of :

(A) Drugs
(B) Chemicals
(C) Devices
(D) All products

77. Patents provide legal protection to inventors by safeguarding their scientific :

(A) Innovation
(B) Storage
(C) Testing
(D) Transport

78. Liposomes are nanoscale vesicles widely used to enhance targeted delivery of :

(A) Proteins
(B) DNA
(C) Drugs
(D) Lipids

79. Biosensors convert biological responses into measurable signals for detection and :

(A) Storage
(B) Analysis
(C) Packaging
(D) Transport

80. Nanoparticle-based drug delivery systems improve therapeutic efficiency and targeted :

(A) Sterilization
(B) Preservation
(C) Delivery
(D) Filtration

81. Chloramphenicol inhibits bacterial growth by binding to ribosomes and blocking :

(A) Protein synthesis
(B) DNA synthesis
(C) Cell wall synthesis
(D) Lipid synthesis

82. Which phase of bacterial growth is most appropriate for evaluating bactericidal activity of antibiotics ?

(A) Log phase
(B) Lag phase
(C) Stationary phase
(D) Death phase

83. Gamma radiation sterilization is widely used for disposable medical supplies due to deep :

(A) Surface action
(B) Penetration
(C) Filtration
(D) Reaction

84. Stability of preservatives ensures continuous antimicrobial activity throughout product :

(A) Storage
(B) Transport
(C) Synthesis
(D) Packaging

85. Bioinformatics tools assist in predicting potential drug targets based on genomic and :

(A) Chemical data
(B) Structural data
(C) Biological data
(D) Environmental data

86. Which parameter is used to evaluate the effectiveness of disinfectants under practical conditions including organic load ?

(A) MIC
(B) MBC
(C) Phenol coefficient
(D) Use-dilution test

87. Quinine, a plant-derived compound, is chemically classified under which category of metabolites ?

(A) Protein
(B) Alkaloid
(C) Lipid
(D) Carbohydrate

88. Z-value in thermal sterilization represents change in temperature required for tenfold change in :

(A) Time
(B) Death rate
(C) Pressure
(D) Volume

89. Contamination in pharmaceutical manufacturing processes can lead to serious safety and :

(A) Hazards
(B) Benefits
(C) Improvements
(D) Stability

90. Combination therapy using multiple drugs is effective in reducing chances of antimicrobial :

(A) Resistance
(B) Stability
(C) Toxicity
(D) Storage

91. Which technique is most suitable for identifying drug-target interactions at atomic resolution ?

(A) ELISA
(B) Gel electrophoresis
(C) X-ray crystallography
(D) Spectrophotometry

92. Which statistical method is commonly used to validate hits obtained from high-throughput screening assays ?

(A) ANOVA
(B) Z-factor analysis
(C) Chi-square test
(D) Regression analysis

93. Clinical trials must strictly follow ethical guidelines to ensure patient safety and :

(A) Compliance
(B) Marketing
(C) Regulation
(D) Transport

94. Secondary metabolites produced by microorganisms serve as important sources of :

(A) Energy
(B) Drugs
(C) Lipids
(D) Proteins

95. Rational drug design involves systematic and integrated approach for developing effective therapeutic :

(A) Agents
(B) Colors
(C) Preservatives
(D) Storage

96. Antimicrobial resistance results in decreased effectiveness of drugs used in treating infections and :

(A) Failure
(B) Improvement
(C) Stability
(D) Enhancement

97. Sterilization is an essential process in pharmaceutical industry to ensure complete removal of :

(A) Chemicals
(B) Microorganisms
(C) Nutrients
(D) Drugs

98. Preservatives used in pharmaceutical formulations must be safe, effective, and non-toxic at :

(A) Required concentrations
(B) High doses
(C) Random levels
(D) Variable doses

99. Which molecular technique is most sensitive for detection of low levels of viral contamination in pharmaceutical products ?

(A) PCR
(B) ELISA
(C) Western blot
(D) Chromatography

100. Computational biology has significantly accelerated modern drug discovery by enabling rapid data :

(A) Processing
(B) Storage
(C) Transport
(D) Elimination

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।