

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

A

SET-Y

Ph.D-EE-December, 2024
Pharmaceutical Science

10021

Sr. No.

Time : 1¼ Hours

Max. Marks : 100

Total Questions : 100

Roll No. (in figures) _____ (in words) _____

Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

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(Signature of the Candidate)

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SEAL

Ph.D-EE-December, 2024/(Pharmaceutical Science)(SET-Y)/(A)

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1. Which of the following statements is INCORRECT about a questionnaire ?
 - (1) A technique for collecting data
 - (2) Large amounts of information can be collected
 - (3) It's quick and easy to collect results
 - (4) An expensive method to collect data
2. Identify the WRONG statement :
 - (1) Meta-analysis is a type of review using statistical methods
 - (2) Literature reviews can also report new/original experiment work
 - (3) Literature reviews are common in research proposal
 - (4) The main types of narrative reviews are evaluative, exploratory and instrumental
3. Preliminary data collection is a part of the research
 - (1) Qualitative
 - (2) Exploratory
 - (3) Explanatory
 - (4) Correlational research
4. Identify the WRONG statement :
 - (1) Too large sample size is unethical and unnecessary
 - (2) Sampling errors can't be eased by sample size
 - (3) Too small sample is unscientific
 - (4) Necessary sample size can be calculated using statistical software
5. A subset that is chosen from a large population ?
 - (1) Parameter
 - (2) Variable
 - (3) Sample
 - (4) Statistic
6. Who provided the Helsinki Declaration for the guidance of the medical research community ?
 - (1) WHO
 - (2) UNO
 - (3) OIC
 - (4) World Medical Association
7. A field of study concerned with the ethics & philosophical implications of certain biological & medical procedures, technologies & treatments is called
 - (1) Bio-medics
 - (2) Biotechnology
 - (3) Biology
 - (4) Bioethics
8. Which test is the part of the parametric test ?
 - (1) Sign Test
 - (2) Run Test for Randomness
 - (3) Kruskal- Willis Test
 - (4) z-test

9. Which of the following is a random sampling method ?
(1) Cluster sampling (2) Quota sampling
(3) Convenience sampling (4) Snowball sampling
10. In a one-way ANOVA, the "one-way" refers to
(1) One dependent variable (2) One level of measurement
(3) One independent variable (4) One constant
11. Chi-square test was developed by :
(1) W. S. Gosset (2) Karl Pearson
(3) A. R. Fisher (4) Pascal
12. Which of the following is a measure of variation ?
(1) Standard Deviation (2) Midrange
(3) Mode (4) Median
13. The student's t-test is :
(1) a statistical test (2) a non-statistical test
(3) a clinical test (4) a biometric test
14. Which of the following is NOT a principle outlined in the Declaration of Helsinki ?
(1) The importance of research must outweigh the risks to participants
(2) Participants must give informed consent
(3) Research should only be conducted on animals, not humans
(4) Vulnerable groups require additional protection in research
15. What does CPCSEA stand for ?
(1) Committee for Protection of Controlled Species in Experimental Animals
(2) Committee for the Purpose of Control and Supervision of Experiments on Animals
(3) Council for Preservation of Careful Study of Experimental Animals
(4) Commission for Planning and Certification of Scientific Experiments on Animals
16. Which ministry oversees the functioning of CPCSEA in India ?
(1) Ministry of Science and Technology
(2) Ministry of Environment, Forest and Climate Change
(3) Ministry of Health and Family Welfare
(4) Ministry of Animal Husbandry

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17. CPCSEA was established under which Act ?
- (1) Wildlife Protection Act, 1972
 - (2) Environment Protection Act, 1986
 - (3) Prevention of Cruelty to Animals Act, 1960
 - (4) Biological Diversity Act, 2002
18. Which of the following methods is NOT recommended for euthanasia in small rodents according to CPCSEA guidelines ?
- (1) Cervical dislocation without anaesthesia
 - (2) Overdose of an inhalant anaesthetic agent
 - (3) Decapitation without sedation
 - (4) Electrocutation
19. Phase II clinical trials focus on :
- (1) Long-term side effects
 - (2) Determining optimal dosing and preliminary efficacy
 - (3) Post-marketing surveillance
 - (4) Cost-effectiveness of the drug
20. Informed consent ensures that :
- (1) Participants are fully aware of the risks, benefits, and purpose of the study
 - (2) Researchers can recruit participants without disclosing full details
 - (3) Consent can be obtained verbally without documentation
 - (4) Participants waive their rights during the study
21. Which phase of clinical trials has the smallest population size ?
- | | |
|--------------|---------------|
| (1) Phase II | (2) Phase I |
| (3) Phase IV | (4) Phase III |
22. Clinical trials in India are governed by which regulatory body ?
- (1) NIH
 - (2) CPCSEA
 - (3) Ministry of Science and Technology
 - (4) Central Drugs Standard Control Organization (CDSCO)

23. What does a p-value less than 0.05 indicate in a test of significance ?
- (1) The null hypothesis is true
 - (2) The result is statistically significant
 - (3) The sample size is too small
 - (4) There is no relationship between variables
24. Which of the following tests is most appropriate for comparing the means of two related samples ?
- (1) F -test
 - (2) One-way ANOVA
 - (3) Paired t-test
 - (4) Chi-square test
25. Blinding may be :
- (1) Single-blind
 - (2) Double-blind
 - (3) Triple-blind
 - (4) Any of the above
26. Which of the following is NOT a thermal detector used in IR spectroscopy ?
- (1) Thermocouple
 - (2) Photoconductive detector
 - (3) Bolometer
 - (4) Pyroelectric detector
27. In IR spectra, C-H stretching of aldehyde is at :
- (1) 2850-2750 cm^{-1}
 - (2) 1750-1725 cm^{-1}
 - (3) 2250-2150 cm^{-1}
 - (4) 2100 cm^{-1}
28. Which of the following bonds would show the strongest absorption in the IR ?
- (1) Carbon-hydrogen
 - (2) Oxygen-hydrogen
 - (3) Nitrogen-hydrogen
 - (4) Sulfur-hydrogen
29. The TGA curve is a plot of :
- (1) Weight vs voltage
 - (2) Weight vs volume of titrant
 - (3) Weight vs current
 - (4) Weight vs temperature
30. Which property of nuclei is essential for them to be NMR active ?
- (1) Even number of protons and neutrons
 - (2) Non-zero nuclear spin
 - (3) High atomic mass
 - (4) High electronegativity
31. Signal splitting in NMR arises from :
- (1) Shielding effect
 - (2) Spin-spin decoupling
 - (3) Spin-spin coupling
 - (4) Deshielding effect

A

32. Which gas is used in gas chromatographic technique ?
(1) Oxygen (2) Chlorine
(3) Helium (4) Sulphur dioxide
33. Hydrogen bonding in organic compounds shifts the ultraviolet absorptions to :
(1) shorter frequencies (2) shorter wavelength
(3) remain unchanged (4) higher wavelength
34. The fingerprint region in IR spectroscopy is in the range of :
(1) 400-800 cm^{-1} (2) 400-1400 cm^{-1}
(3) 1500-2000 cm^{-1} (4) 2800-3500 cm^{-1}
35. McLafferty rearrangement ion peak in the mass spectrum is usually the basic peak for :
(1) amines (2) alcohols
(3) amides (4) aldehydes
36. Which of the following is NOT true about the guard column used in liquid chromatography ?
(1) It allows particles that cause precipitation upon contact with stationary or mobile phase
(2) It filters particles that clog the separation column
(3) It extends the lifetime of separation column
(4) The size of packing varies with the type of protection needed
37. Which of the following ionization techniques is used in molecular weight determination of large biomolecules using mass spectrometry ?
(1) Electron impact (2) Chemical ionization
(3) MALDI (4) None of the above
38. Which of the following is NOT a type of electrophoresis technique ?
(1) Paper (2) Current
(3) Zone (4) Capillary
39. The principle of paper chromatography is :
(1) Adsorption (2) Partition
(3) Ion exchange (4) Affinity
40. Indicate the HPLC detector that is most sensitive to changes in temperature :
(1) PDA detector (2) Refractive Index detector
(3) UV/V is detector (4) Electrochemical detector

41. NDA is filled at which of the following stages ?
(1) Before Phase I (2) After Phase III
(3) During preclinical stages (4) After Phase II
42. An unequal distribution of color on the surface of the tablet is called :
(1) Cracking (2) Chipping
(3) Picking (4) Mottling
43. Nanoparticles are defined as particles with a size range of :
(1) 1-100 nm (2) 100-1000 nm
(3) 1-10 μm (4) 10-100 μm
44. In which step of the sugar-coating process colorant is used :
(1) Sealing (2) Syrup-coating
(3) Sub-coating (4) Polishing
45. Which of the following capsule sizes accommodates the highest volume ?
(1) 0 (2) 1
(3) 5 (4) 000
46. The following tests are necessary for the quality testing of parenteral EXCEPT :
(1) Pyrogen test (2) Leaker test
(3) Sterility test (4) Conductivity test
47. The antimicrobial agent used in the ophthalmic solution is :
(1) Benzalkonium chloride (2) Salicylic acid
(3) Sodium bicarbonate (4) PEG 4000
48. The test animal used for pyrogen testing is :
(1) Rat (2) Mice
(3) Rabbit (4) Guinea pig
49. The aseptic area is :
(1) Class 100 area (2) Class 1000 area
(3) Class 10 area (4) Class 10000 area
50. The following is NOT used as a measure of the flow property of the powder :
(1) Compressibility index (2) Hausner's ratio
(3) Angle of repose (4) Bulk density

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51. Schedule X of the Drugs and Cosmetics Act comprises :
- | | |
|--------------------------------|-------------------------------------|
| (1) List of incurable diseases | (2) Guidelines for clinical trials |
| (3) List of generic drugs | (4) Narcotic and psychotropic drugs |
52. The first edition of Indian Pharmacopoeia was published in the year :
- | | |
|----------|----------|
| (1) 1940 | (2) 1950 |
| (3) 1955 | (4) 1985 |
53. Which of the following devices/techniques is under the transdermal drug delivery system category ?
- | | |
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| (1) Micelles and dendrimers | (2) Liposomes |
| (3) Matrix patches | (4) Nanoparticles |
54. The maximum pressure to be filled in plastic aerosol containers is :
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| (1) 25 psi | (2) 50 psi |
| (3) 10 psi | (4) 15 psi |
55. Which among the following is NOT used in a toothpaste :
- | | |
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| (1) Abrasive | (2) Humectant |
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56. The heterocyclic nucleus present in Cimetidine is :
- | | |
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| (1) Imidazole | (2) Benzimidazole |
| (3) Thiazole | (4) None of the above |
57. Ing's Rule of Five is associated with :
- | | |
|-----------------------|-------------------------|
| (1) Cholinergic drugs | (2) Adrenergic drugs |
| (3) Antihistaminics | (4) Oral anticoagulants |
58. What is the parent heterocyclic nucleus present in anti-hypertensive drug clonidine ?
- | | |
|---------------|---------------|
| (1) Quinoline | (2) Imidazole |
| (3) Pyrrole | (4) Pyrazole |
59. Which of the following antidepressant drugs is having dibenzazepine skeleton ?
- | | |
|----------------|--------------------|
| (1) Imipramine | (2) Amitriptyline |
| (3) Doxepin | (4) Chlorpromazine |
60. Pregnanes are steroid having carbon atoms
- | | |
|--------|--------|
| (1) 21 | (2) 20 |
| (3) 19 | (4) 18 |

61. Which of the following statements is WRONG ?
- (1) When two orbitals overlap in phase with each other, a bonding molecular orbital forms.
 - (2) When two orbitals overlap out-of-phase with each other, an antibonding molecular orbital forms.
 - (3) When one of two atoms connected by a σ bond rotates about the bond axis, orbital overlap is lost.
 - (4) When one of two atoms connected by a π bond rotates about the bond axis, orbital overlap is lost.
62. The following is NOT an example of alkylating agents (anti-neoplastic) :
- | | |
|------------------|---------------|
| (1) Methotrexate | (2) Busulfan |
| (3) Carmustine | (4) Cisplatin |
63. Following is an example of fluoroquinolones :
- | | |
|------------------|---------------------|
| (1) Ofloxacin | (2) Chloramphenicol |
| (3) Azithromycin | (4) Ampicillin |
64. Which of the following groups has the highest priority according to the Cahn-Ingold-Prelog sequence rules ?
- | | |
|----------------------------|----------------------------|
| (1) CH_3 | (3) CH_2Cl |
| (2) CH_2OH | (4) CHO |
65. What is the term for molecules that are non-superimposable mirror images of each other ?
- | | |
|-------------------|-----------------|
| (1) Diastereomers | (2) Enantiomers |
| (3) Isotopes | (4) Conformers |
66. What is the primary purpose of bioisosteric replacement in drug design ?
- (1) Increase the molecular weight of a drug molecule
 - (2) Enhance the desired biological activity of a drug
 - (3) Reduce the cost of synthesis
 - (4) Change the color of the drug molecule
67. Identify the oral anticoagulant among the following :
- | | |
|--------------|------------------|
| (1) Heparin | (2) Fondaparinux |
| (3) Warfarin | (4) Lepirudin |

68. Which is an example of a prodrug that requires enzymatic activation ?
(1) Paracetamol (2) Enalapril
(3) Metformin (4) Propranolol
69. What is post-precipitation ?
(1) Precipitation of the main analyte at the end of titration
(2) Precipitation of impurities after the main precipitate has formed
(3) Formation of a supersaturated solution
(4) Precipitation that occurs only with rapid addition of the titrant
70. Which anti-viral agent is a symmetrical tricyclic primary amine ?
(1) Amantadine (2) Zanamivir
(3) Acyclovir (4) All of the above
71. Alkalinisation of urine hastens the excretion of :
(1) Weakly basic drugs (2) Weakly acidic drugs
(3) Strong electrolytes (4) Nonpolar drugs
72. The following drugs have more than 99% protein-binding capacity
Digoxin [P]; Aspirin [Q]; Thyroxine [R]; Warfarin [S]
(1) P and Q (2) P and R
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73. Which of the following receptors shows the slowest response ?
(1) GPCR (2) Ion channel
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74. Which of the following is NOT an example of reversible anticholinesterases ?
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75. Bioavailability of drug refers to :
(1) Percentage of administered dose that reaches systemic circulation
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76. High plasma protein binding :
- (1) Increases the volume of distribution of the drug
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 - (4) Makes the drug long-acting
77. The following receptor is NOT linked to CNS functions :
- (1) Histamine H₁
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78. Which of the following is NOT a Phase II reaction ?
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- (1) Maximum tolerated dose (MTD)
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80. Which of the following is NOT a characteristic of metabotropic receptors ?
- (1) Activation involves G-proteins
 - (2) Responses are slower but prolonged
 - (3) Directly regulate ion channels
 - (4) Can activate second messenger cascades
81. The enzyme catechol-O-methyltransferase (COMT) is primarily involved in :
- (1) Synaptic reuptake of dopamine
 - (2) Increasing catecholamines
 - (3) Degradation of catecholamines
 - (4) Activation of norepinephrine
82. The following receptor type is both ligand-gated and voltage-dependent :
- (1) AMPA
 - (2) Kainate
 - (3) NMDA
 - (4) Metabotropic glutamate
83. Which of the following neurotransmitters does NOT have a reuptake mechanism as its primary mode of termination ?
- (1) Acetylcholine
 - (2) Dopamine
 - (3) Norepinephrine
 - (4) Serotonin

A

84. A drug with a high volume of distribution (V_d) indicates that it :
- (1) Remains primarily in the plasma
 - (2) Distributes extensively into tissues
 - (3) Rapidly excreted by the kidneys
 - (4) Undergoes extensive first-pass metabolism
85. The half-life ($t_{1/2}$) of a toxicant is directly proportional to its :
- (1) Clearance (CL)
 - (2) Volume of distribution (V_d)
 - (3) Absorption rate
 - (4) Plasma concentration
86. In Lycopodium spore method number of characteristic structures in fields selected is
- (1) 20
 - (2) 43
 - (3) 25
 - (4) 56
87. Which among the following is NOT a leaf constant ?
- (1) Palisade ratio
 - (2) Stomatal index
 - (3) Carr index
 - (4) Vein-Islet Number
88. Which of the following pair of alkaloids are volatile ?
- (1) Morphine and papaverine
 - (2) Atropine and quinine
 - (3) Nicotine and coniine
 - (4) None of these
89. Identify the drug/plant containing Withanine :
- (1) Ashwagandha
 - (2) Cinchona
 - (3) Ergot
 - (4) Opium
90. Which test is used to detect the presence of alkaloids in a plant extract ?
- (1) Borntrager's test
 - (2) Dragendroff's test
 - (3) Molisch test
 - (4) Biuret's test
91. Mark the pseudoalkaloids from the following
- (1) Atropine
 - (2) Theophylline
 - (3) Adrenaline
 - (4) Morphine
92. Cinchona bark is primarily used for its :
- (1) Antidiabetic activity
 - (2) Antimalarial property
 - (3) Laxative action
 - (4) Cardioprotective effect

93. Which active constituent is predominantly found in Senna ?
(1) Reserpine (2) Anthraquinones
(3) Atropine (4) Quinine
94. Identification of drugs based on its taste and smell is :
(1) Organoleptic evaluation (2) Physical evaluation
(3) Chemical Evaluation (4) Microscopical evaluation
95. Palisade ratio is :
(1) Total number of palisade cells beneath each epidermal cell
(2) Total number of Palisade cells beneath mesophyll
(3) Average number of Palisade cells beneath each epidermal cell
(4) Average number of Palisade cells beneath four continuous epidermal cells
96. The following statements are true for alkaloids EXCEPT :
(1) Alkaloids are polyphenolic compounds
(2) Alkaloids are basic
(3) Alkaloids are derived from amino acids
(4) Alkaloids are secondary metabolites
97. Which Ayurvedic preparation involves fermentation and contains natural alcohol ?
(1) Churna (2) Guggulu
(3) Arishta/Asava (4) Bhasma
98. The agar diffusion method is commonly employed for
(1) Hepatoprotective activity (2) Antimicrobial activity
(3) Anti-inflammatory activity (4) Cardiovascular activity
99. Which bioactive compound in turmeric exhibits potent anti-inflammatory activity ?
(1) Eugenol (2) Curcumin
(3) Resveratrol (4) Catechin
100. What is the principal biological activity of morphine, an alkaloid derived from opium ?
(1) Antimicrobial (2) Analgesic
(3) Anticancer (4) Anti-inflammatory

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SEAL

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 - (4) Nonpolar drugs
2. The following drugs have more than 99% protein-binding capacity
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25. McLafferty rearrangement ion peak in the mass spectrum is usually the basic peak for :
(1) amines (2) alcohols
(3) amides (4) aldehydes
26. Which of the following is NOT true about the guard column used in liquid chromatography ?
(1) It allows particles that cause precipitation upon contact with stationary or mobile phase
(2) It filters particles that clog the separation column
(3) It extends the lifetime of separation column
(4) The size of packing varies with the type of protection needed

27. Which of the following ionization techniques is used in molecular weight determination of large biomolecules using mass spectrometry ?
- (1) Electron impact (2) Chemical ionization
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28. Which of the following is NOT a type of electrophoresis technique ?
- (1) Paper (2) Current
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29. The principle of paper chromatography is :
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(3) Ion exchange (4) Affinity
30. Indicate the HPLC detector that is most sensitive to changes in temperature :
- (1) PDA detector (2) Refractive Index detector
(3) UV/V is detector (4) Electrochemical detector
31. Chi-square test was developed by :
- (1) W. S. Gosset (2) Karl Pearson
(3) A. R. Fisher (4) Pascal
32. Which of the following is a measure of variation ?
- (1) Standard Deviation (2) Midrange
(3) Mode (4) Median
33. The student's t-test is :
- (1) a statistical test (2) a non-statistical test
(3) a clinical test (4) a biometric test
34. Which of the following is NOT a principle outlined in the Declaration of Helsinki ?
- (1) The importance of research must outweigh the risks to participants
(2) Participants must give informed consent
(3) Research should only be conducted on animals, not humans
(4) Vulnerable groups require additional protection in research
35. What does CPCSEA stand for ?
- (1) Committee for Protection of Controlled Species in Experimental Animals
(2) Committee for the Purpose of Control and Supervision of Experiments on Animals
(3) Council for Preservation of Careful Study of Experimental Animals
(4) Commission for Planning and Certification of Scientific Experiments on Animals

B

36. Which ministry oversees the functioning of CPCSEA in India ?
- (1) Ministry of Science and Technology
 - (2) Ministry of Environment, Forest and Climate Change
 - (3) Ministry of Health and Family Welfare
 - (4) Ministry of Animal Husbandry
37. CPCSEA was established under which Act ?
- (1) Wildlife Protection Act, 1972
 - (2) Environment Protection Act, 1986
 - (3) Prevention of Cruelty to Animals Act, 1960
 - (4) Biological Diversity Act, 2002
38. Which of the following methods is NOT recommended for euthanasia in small rodents according to CPCSEA guidelines ?
- (1) Cervical dislocation without anaesthesia
 - (2) Overdose of an inhalant anaesthetic agent
 - (3) Decapitation without sedation
 - (4) Electrocution
39. Phase II clinical trials focus on :
- (1) Long-term side effects
 - (2) Determining optimal dosing and preliminary efficacy
 - (3) Post-marketing surveillance -
 - (4) Cost-effectiveness of the drug
40. Informed consent ensures that :
- (1) Participants are fully aware of the risks, benefits, and purpose of the study
 - (2) Researchers can recruit participants without disclosing full details
 - (3) Consent can be obtained verbally without documentation
 - (4) Participants waive their rights during the study
41. Mark the pseudoalkaloids from the following
- | | |
|----------------|------------------|
| (1) Atropine | (2) Theophylline |
| (3) Adrenaline | (4) Morphine |

42. Cinchona bark is primarily used for its :
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- (1) Eugenol (2) Curcumin
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50. What is the principal biological activity of morphine, an alkaloid derived from opium ?
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51. Which of the following statements is WRONG ?
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(3) Acyclovir (4) All of the above
61. The enzyme catechol-O-methyltransferase (COMT) is primarily involved in :
(1) Synaptic reuptake of dopamine (2) Increasing catecholamines
(3) Degradation of catecholamines (4) Activation of norepinephrine
62. The following receptor type is both ligand-gated and voltage-dependent :
(1) AMPA (2) Kainate
(3) NMDA (4) Metabotropic glutamate
63. Which of the following neurotransmitters does NOT have a reuptake mechanism as its primary mode of termination ?
(1) Acetylcholine (2) Dopamine
(3) Norepinephrine (4) Serotonin
64. A drug with a high volume of distribution (V_d) indicates that it :
(1) Remains primarily in the plasma
(2) Distributes extensively into tissues
(3) Rapidly excreted by the kidneys
(4) Undergoes extensive first-pass metabolism
65. The half-life ($t_{1/2}$) of a toxicant is directly proportional to its :
(1) Clearance (CL) (2) Volume of distribution (V_d)
(3) Absorption rate (4) Plasma concentration
66. In Lycopodium spore method number of characteristic structures in fields selected is
(1) 20 (2) 43 (3) 25 (4) 56

67. Which among the following is NOT a leaf constant ?
(1) Palisade ratio (2) Stomatal index
(3) Carr index (4) Vein-Islet Number
68. Which of the following pair of alkaloids are volatile ?
(1) Morphine and papaverine (2) Atropine and quinine
(3) Nicotine and coniine (4) None of these
69. Identify the drug/plant containing Withanine :
(1) Ashwagandha (2) Cinchona
(3) Ergot (4) Opium
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B

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(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

C

SET-Y

Ph.D-EE-December, 2024
Pharmaceutical Science

10003

Sr. No.

Time : 1¼ Hours

Max. Marks : 100

Total Questions : 100

Roll No. (in figures) _____ (in words) _____

Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Date of Examination _____

(Signature of the Candidate)

(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. **All questions are compulsory.**
2. The candidates **must return** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate **must not** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers **must not** be ticked in the question booklet.
6. **There shall be negative marking. A deduction of 0.25 marks shall be there for each wrong answer. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. **Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.**

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 - (2) Weakly acidic drugs
 - (3) Strong electrolytes
 - (4) Nonpolar drugs
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Digoxin [P]; Aspirin [Q]; Thyroxine [R]; Warfarin [S]
- (1) P and Q
 - (2) P and R
 - (3) Q and S
 - (4) R and S
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 - (2) Increasing catecholamines
 - (3) Degradation of catecholamines
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72. The following receptor type is both ligand-gated and voltage-dependent :
- (1) AMPA
 - (2) Kainate
 - (3) NMDA
 - (4) Metabotropic glutamate
73. Which of the following neurotransmitters does NOT have a reuptake mechanism as its primary mode of termination ?
- (1) Acetylcholine
 - (2) Dopamine
 - (3) Norepinephrine
 - (4) Serotonin
74. A drug with a high volume of distribution (V_d) indicates that it :
- (1) Remains primarily in the plasma
 - (2) Distributes extensively into tissues
 - (3) Rapidly excreted by the kidneys
 - (4) Undergoes extensive first-pass metabolism
75. The half-life ($t_{1/2}$) of a toxicant is directly proportional to its :
- (1) Clearance (CL)
 - (2) Volume of distribution (V_d)
 - (3) Absorption rate
 - (4) Plasma concentration
76. In Lycopodium spore method number of characteristic structures in fields selected is
- (1) 20
 - (2) 43
 - (3) 25
 - (4) 56

77. Which among the following is NOT a leaf constant ?
(1) Palisade ratio (2) Stomatal index
(3) Carr index (4) Vein-Islet Number
78. Which of the following pair of alkaloids are volatile ?
(1) Morphine and papaverine (2) Atropine and quinine
(3) Nicotine and coniine (4) None of these
79. Identify the drug/plant containing Withanine :
(1) Ashwagandha (2) Cinchona
(3) Ergot (4) Opium
80. Which test is used to detect the presence of alkaloids in a plant extract ?
(1) Borntrager's test (2) Dragendroff's test
(3) Molisch test (4) Biuret's test
81. Chi-square test was developed by :
(1) W. S. Gosset (2) Karl Pearson
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82. Which of the following is a measure of variation ?
(1) Standard Deviation (2) Midrange
(3) Mode (4) Median
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84. Which of the following is NOT a principle outlined in the Declaration of Helsinki ?
(1) The importance of research must outweigh the risks to participants.
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(3) Research should only be conducted on animals, not humans
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85. What does CPCSEA stand for ?
(1) Committee for Protection of Controlled Species in Experimental Animals
(2) Committee for the Purpose of Control and Supervision of Experiments on Animals
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- Ph. D.-EE-December, 2024/(Pharmaceutical Science)(SET-Y)/(C)**

C

86. Which ministry oversees the functioning of CPCSEA in India ?
- (1) Ministry of Science and Technology
 - (2) Ministry of Environment, Forest and Climate Change
 - (3) Ministry of Health and Family Welfare
 - (4) Ministry of Animal Husbandry
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- (1) Wildlife Protection Act, 1972
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88. Which of the following methods is NOT recommended for euthanasia in small rodents according to CPCSEA guidelines ?
- (1) Cervical dislocation without anaesthesia
 - (2) Overdose of an inhalant anaesthetic agent
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 - (4) Electrocution
89. Phase II clinical trials focus on :
- (1) Long-term side effects
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91. Schedule X of the Drugs and Cosmetics Act comprises :
- | | |
|--------------------------------|-------------------------------------|
| (1) List of incurable diseases | (2) Guidelines for clinical trials |
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92. The first edition of Indian Pharmacopoeia was published in the year :
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93. Which of the following devices/techniques is under the transdermal drug delivery system category ?
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(3) Doxepin (4) Chlorpromazine
100. Pregnanes are steroid having carbon atoms
(1) 21 (2) 20
(3) 19 (4) 18

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU
ARE ASKED TO DO SO)

D

SET-Y

Ph.D-EE-December, 2024
Pharmaceutical Science

10032

Sr. No.

Time : 1¼ Hours

Max. Marks : 100

Total Questions : 100

Roll No. (in figures) _____ (in words) _____

Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Date of Examination _____

(Signature of the Candidate)

(Signature of the Invigilator)

**CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE
STARTING THE QUESTION PAPER.**

- All questions are compulsory.**
- The candidates **must return** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
- The candidate **must not** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers **must not** be ticked in the question booklet.
- There shall be negative marking. A deduction of 0.25 marks shall be there for each wrong answer. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.**
- Use only **Black or Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
- Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.**

Ph.D-EE-December, 2024/(Pharmaceutical Science)(SET-Y)/(D)

SEAL

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11. Mark the pseudoalkaloids from the following
- | | |
|----------------|------------------|
| (1) Atropine | (2) Theophylline |
| (3) Adrenaline | (4) Morphine |
12. Cinchona bark is primarily used for its :
- | | |
|---------------------------|-----------------------------|
| (1) Antidiabetic activity | (2) Antimalarial property |
| (3) Laxative action | (4) Cardioprotective effect |
13. Which active constituent is predominantly found in Senna ?
- | | |
|---------------|--------------------|
| (1) Reserpine | (2) Anthraquinones |
| (3) Atropine | (4) Quinine |
14. Identification of drugs based on its taste and smell is :
- | | |
|-----------------------------|------------------------------|
| (1) Organoleptic evaluation | (2) Physical evaluation |
| (3) Chemical Evaluation | (4) Microscopical evaluation |

D

15. Palisade ratio is :
- (1) Total number of palisade cells beneath each epidermal cell
 - (2) Total number of Palisade cells beneath mesophyll
 - (3) Average number of Palisade cells beneath each epidermal cell
 - (4) Average number of Palisade cells beneath four continuous epidermal cells
16. The following statements are true for alkaloids EXCEPT :
- (1) Alkaloids are polyphenolic compounds
 - (2) Alkaloids are basic
 - (3) Alkaloids are derived from amino acids
 - (4) Alkaloids are secondary metabolites
17. Which Ayurvedic preparation involves fermentation and contains natural alcohol ?
- (1) Churna
 - (2) Guggulu
 - (3) Arishta/Asava
 - (4) Bhasma
18. The agar diffusion method is commonly employed for
- (1) Hepatoprotective activity
 - (2) Antimicrobial activity
 - (3) Anti-inflammatory activity
 - (4) Cardiovascular activity
19. Which bioactive compound in turmeric exhibits potent anti-inflammatory activity ?
- (1) Eugenol
 - (2) Curcumin
 - (3) Resveratrol
 - (4) Catechin
20. What is the principal biological activity of morphine, an alkaloid derived from opium ?
- (1) Antimicrobial
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41. Signal splitting in NMR arises from :
(1) Shielding effect (2) Spin-spin decoupling
(3) Spin-spin coupling (4) Deshielding effect

42. Which gas is used in gas chromatographic technique ?
(1) Oxygen (2) Chlorine
(3) Helium (4) Sulphur dioxide
43. Hydrogen bonding in organic compounds shifts the ultraviolet absorptions to :
(1) shorter frequencies (2) shorter wavelength
(3) remain unchanged (4) higher wavelength
44. The fingerprint region in IR spectroscopy is in the range of :
(1) $400-800\text{ cm}^{-1}$ (2) $400-1400\text{ cm}^{-1}$
(3) $1500-2000\text{ cm}^{-1}$ (4) $2800-3500\text{ cm}^{-1}$
45. McLafferty rearrangement ion peak in the mass spectrum is usually the basic peak for :
(1) amines (2) alcohols
(3) amides (4) aldehydes
46. Which of the following is NOT true about the guard column used in liquid chromatography ?
(1) It allows particles that cause precipitation upon contact with stationary or mobile phase
(2) It filters particles that clog the separation column
(3) It extends the lifetime of separation column
(4) The size of packing varies with the type of protection needed
47. Which of the following ionization techniques is used in molecular weight determination of large biomolecules using mass spectrometry ?
(1) Electron impact (2) Chemical ionization
(3) MALDI (4) None of the above
48. Which of the following is NOT a type of electrophoresis technique ?
(1) Paper (2) Current
(3) Zone (4) Capillary
49. The principle of paper chromatography is :
(1) Adsorption (2) Partition
(3) Ion exchange (4) Affinity
50. Indicate the HPLC detector that is most sensitive to changes in temperature :
(1) PDA detector (2) Refractive Index detector
(3) UV/V is detector (4) Electrochemical detector

D

51. Which phase of clinical trials has the smallest population size ?
(1) Phase II (2) Phase I
(3) Phase IV (4) Phase III
52. Clinical trials in India are governed by which regulatory body ?
(1) NIH
(2) CPCSEA
(3) Ministry of Science and Technology
(4) Central Drugs Standard Control Organization (CDSCO)
53. What does a p-value less than 0.05 indicate in a test of significance ?
(1) The null hypothesis is true
(2) The result is statistically significant
(3) The sample size is too small
(4) There is no relationship between variables
54. Which of the following tests is most appropriate for comparing the means of two related samples ?
(1) F -test (2) One-way ANOVA
(3) Paired t-test (4) Chi-square test
55. Blinding may be :
(1) Single-blind (2) Double-blind
(3) Triple-blind (4) Any of the above
56. Which of the following is NOT a thermal detector used in IR spectroscopy ?
(1) Thermocouple (2) Photoconductive detector
(3) Bolometer (4) Pyroelectric detector
57. In IR spectra, C-H stretching of aldehyde is at :
(1) $2850-2750\text{ cm}^{-1}$ (2) $1750-1725\text{ cm}^{-1}$
(3) $2250-2150\text{ cm}^{-1}$ (4) 2100 cm^{-1}
58. Which of the following bonds would show the strongest absorption in the IR ?
(1) Carbon-hydrogen (2) Oxygen-hydrogen
(3) Nitrogen-hydrogen (4) Sulfur-hydrogen

59. The TGA curve is a plot of :
(1) Weight vs voltage (2) Weight vs volume of titrant
(3) Weight vs current (4) Weight vs temperature
60. Which property of nuclei is essential for them to be NMR active ?
(1) Even number of protons and neutrons (2) Non-zero nuclear spin
(3) High atomic mass (4) High electronegativity
61. NDA is filled at which of the following stages ?
(1) Before Phase I (2) After Phase III
(3) During preclinical stages (4) After Phase II
62. An unequal distribution of color on the surface of the tablet is called :
(1) Cracking (2) Chipping
(3) Picking (4) Mottling
63. Nanoparticles are defined as particles with a size range of :
(1) 1-100 nm (2) 100-1000 nm
(3) 1-10 μm (4) 10-100 μm
64. In which step of the sugar-coating process colorant is used :
(1) Sealing (2) Syrup-coating
(3) Sub-coating (4) Polishing
65. Which of the following capsule sizes accommodates the highest volume ?
(1) 0 (2) 1
(3) 5 (4) 000
66. The following tests are necessary for the quality testing of parenteral EXCEPT :
(1) Pyrogen test (2) Leaker test
(3) Sterility test (4) Conductivity test
67. The antimicrobial agent used in the ophthalmic solution is :
(1) Benzalkonium chloride (2) Salicylic acid
(3) Sodium bicarbonate (4) PEG 4000
68. The test animal used for pyrogen testing is :
(1) Rat (2) Mice
(3) Rabbit (4) Guinea pig

69. The aseptic area is :
- (1) Class 100 area (2) Class 1000 area
(3) Class 10 area (4) Class 10000 area
70. The following is NOT used as a measure of the flow property of the powder :
- (1) Compressibility index (2) Hausner's ratio
(3) Angle of repose (4) Bulk density
71. Which of the following statements is WRONG ?
- (1) When two orbitals overlap in phase with each other, a bonding molecular orbital forms.
(2) When two orbitals overlap out-of-phase with each other, an antibonding molecular orbital forms.
(3) When one of two atoms connected by a σ bond rotates about the bond axis, orbital overlap is lost.
(4) When one of two atoms connected by a π bond rotates about the bond axis, orbital overlap is lost.
72. The following is NOT an example of alkylating agents (anti-neoplastic) :
- (1) Methotrexate (2) Busulfan
(3) Carmustine (4) Cisplatin
73. Following is an example of fluoroquinolones :
- (1) Ofloxacin (2) Chloramphenicol
(3) Azithromycin (4) Ampicillin
74. Which of the following groups has the highest priority according to the Cahn-Ingold-Prelog sequence rules ?
- (1) CH_3 (3) CH_2Cl
(2) CH_2OH (4) CHO
75. What is the term for molecules that are non-superimposable mirror images of each other ?
- (1) Diastereomers (2) Enantiomers
(3) Isotopes (4) Conformers

76. What is the primary purpose of bioisosteric replacement in drug design ?
- (1) Increase the molecular weight of a drug molecule
 - (2) Enhance the desired biological activity of a drug
 - (3) Reduce the cost of synthesis
 - (4) Change the color of the drug molecule
77. Identify the oral anticoagulant among the following :
- (1) Heparin
 - (2) Fondaparinux
 - (3) Warfarin
 - (4) Lepirudin
78. Which is an example of a prodrug that requires enzymatic activation ?
- (1) Paracetamol
 - (2) Enalapril
 - (3) Metformin
 - (4) Propranolol
79. What is post-precipitation ?
- (1) Precipitation of the main analyte at the end of titration
 - (2) Precipitation of impurities after the main precipitate has formed
 - (3) Formation of a supersaturated solution
 - (4) Precipitation that occurs only with rapid addition of the titrant
80. Which anti-viral agent is a symmetrical tricyclic primary amine ?
- (1) Amantadine
 - (2) Zanamivir
 - (3) Acyclovir
 - (4) All of the above
81. Which of the following statements is INCORRECT about a questionnaire ?
- (1) A technique for collecting data
 - (2) Large amounts of information can be collected
 - (3) It's quick and easy to collect results
 - (4) An expensive method to collect data
82. Identify the WRONG statement :
- (1) Meta-analysis is a type of review using statistical methods
 - (2) Literature reviews can also report new/original experiment work
 - (3) Literature reviews are common in research proposal
 - (4) The main types of narrative reviews are evaluative, exploratory and instrumental
83. Preliminary data collection is a part of the research
- (1) Qualitative
 - (2) Exploratory
 - (3) Explanatory
 - (4) Correlational research

84. Identify the WRONG statement :
- (1) Too large sample size is unethical and unnecessary
 - (2) Sampling errors can't be eased by sample size
 - (3) Too small sample is unscientific
 - (4) Necessary sample size can be calculated using statistical software
85. A subset that is chosen from a large population ?
- (1) Parameter
 - (2) Variable
 - (3) Sample
 - (4) Statistic
86. Who provided the Helsinki Declaration for the guidance of the medical research community ?
- (1) WHO
 - (2) UNO
 - (3) OIC
 - (4) World Medical Association
87. A field of study concerned with the ethics & philosophical implications of certain biological & medical procedures, technologies & treatments is called
- (1) Bio-medics
 - (2) Biotechnology
 - (3) Biology
 - (4) Bioethics
88. Which test is the part of the parametric test ?
- (1) Sign Test
 - (2) Run Test for Randomness
 - (3) Kruskal- Willis Test
 - (4) z-test
89. Which of the following is a random sampling method ?
- (1) Cluster sampling
 - (2) Quota sampling
 - (3) Convenience sampling
 - (4) Snowball sampling
90. In a one-way ANOVA, the "one-way" refers to
- (1) One dependent variable
 - (2) One level of measurement
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(4) Undergoes extensive first-pass metabolism
95. The half-life ($t_{1/2}$) of a toxicant is directly proportional to its :
- (1) Clearance (CL) (2) Volume of distribution (V_d)
(3) Absorption rate (4) Plasma concentration
96. In Lycopodium spore method number of characteristic structures in fields selected is
- (1) 20 (2) 43
(3) 25 (4) 56
97. Which among the following is NOT a leaf constant ?
- (1) Palisade ratio (2) Stomatal index
(3) Carr index (4) Vein-Islet Number
98. Which of the following pair of alkaloids are volatile ?
- (1) Morphine and papaverine (2) Atropine and quinine
(3) Nicotine and coniine (4) None of these
99. Identify the drug/plant containing Withanine :
- (1) Ashwagandha (2) Cinchona
(3) Ergot (4) Opium
100. Which test is used to detect the presence of alkaloids in a plant extract ?
- (1) Borntrager's test (2) Dragendroff's test
(3) Molisch test (4) Biuret's test

Answer keys of PH.D (PHARMACEUTICAL SCIENCES) entrance exam dated 05.12.2024

Q. NO.	A	B	C	D
1	4	2	2	2
2	2	4	4	1
3	2	4	1	1
4	2	3	2	3
5	3	1	4	2
6	4	4	4	2
7	4	2	1	3
8	4	2	3	4
9	1	4	1	2
10	3	3	4	1
11	2	4	2	2
12	1	3	4	2
13	1	3	2	2
14	3	1	3	1
15	2	4	4	3
16	2	1	2	1
17	3	1	1	3
18	4	2	2	2
19	2	1	4	2
20	1	1	2	2
21	2	3	4	2
22	4	3	2	4
23	2	2	2	4
24	3	2	2	3
25	4	4	3	1
26	2	1	4	4
27	1	3	4	2
28	2	2	4	2
29	4	2	1	4
30	2	2	3	3
31	3	2	2	4
32	3	1	2	3
33	2	1	2	3
34	2	3	1	1
35	4	2	3	4
36	1	2	1	1
37	3	3	3	1
38	2	4	2	2
39	2	2	2	1
40	2	1	2	1
41	2	2	3	3
42	4	2	1	3
43	1	2	1	2
44	2	1	2	2
45	4	3	2	4
46	4	1	2	1
47	1	3	3	3
48	3	2	2	2
49	1	2	2	2
50	4	2	1	2

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Answer keys of PH.D (PHARMACEUTICAL SCIENCES) entrance exam dated 05.12.2024

Q. NO.	A	B	C	D
51	4	3	3	2
52	3	1	3	4
53	3	1	2	2
54	1	2	2	3
55	4	2	4	4
56	1	2	1	2
57	1	3	3	1
58	2	2	2	2
59	1	2	2	4
60	1	1	2	2
61	3	3	2	2
62	1	3	4	4
63	1	1	4	1
64	2	2	3	2
65	2	2	1	4
66	2	3	4	4
67	3	3	2	1
68	2	3	2	3
69	2	1	4	1
70	1	2	3	4
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72	4	4	3	1
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74	3	2	2	2
75	1	4	2	2
76	4	4	3	2
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86	3	2	2	4
87	3	1	3	4
88	3	2	4	4
89	1	4	2	1
90	2	2	1	3
91	2	4	4	3
92	2	2	3	3
93	2	2	3	1
94	1	2	1	2
95	3	3	4	2
96	1	4	1	3
97	3	4	1	3
98	2	4	2	3
99	2	1	1	1
100	2	3	1	2

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