### Total No. of Printed Pages : 13 (DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO) Ph.D-EE-December, 2024 Pharmaceutical Science 10021

Sr. No. .....

Time : <b>1¼ Hours</b>	Max. Marks : 100	Total Questions : 100
Roll No. (in figures)		900
Name	Date of Birth	
Father's Name	Mother's Name	×.
Date of Examination		

(Signature of the Candidate)

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

- Α
- 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

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- Which of the following is a random sampling method? 9.
  - (2) Quota sampling (1) Cluster sampling
    - (4) Snowball sampling (3) Convenience sampling
- 10. In a one-way ANOVA, the "one-way" refers to
  - (2) One level of measurement (1) One dependent variable
  - (4) One constant (3) One independent variable
- Chi-square test was developed by : 11.
  - (1) W. S. Gosset
  - (3) A. R. Fisher

Which of the following is a measure of variation? 12.

- (2) Midrange (1) Standard Deviation
- (4) Median (3) Mode
- The student's t-test is : 13.
  - (2) a non-statistical test (1) a statistical test
  - (4) a biometric test (3) a clinical test

Which of the following is NOT a principle outlined in the Declaration of Helsinki? 14.

- (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
- What does CPCSEA stand for ? 15.
  - (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
- Which ministry oversees the functioning of CPCSEA in India? 16.
  - (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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Α

- (2) Karl Pearson
- (4) Pascal

Α

- 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 cuthanasia 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
- **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)

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- **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 ?

- (2) One-way ANOYA (1) F-test
- (4) Chi-square test (3) Paired t-test
- 25. Blinding may be :
  - (2) Double-blind (1) Single-blind
  - (4) Any of the above (3) Triple-blind

26. Which of the following is NOT a thermal detector used in IR spectroscopy ?

- (2) Photoconductive detector (1) Thermocouple
- (4) Pyroelectric detector (3) Bolometer

27. 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)  $2100 \text{ cm}^{-1}$

Which of the following bonds would show the strongest absorption in the IR? 28.

- (1) Carbon-hydrogen (2) Oxygen-hydrogen
- (3) Nitrogen-hydrogen (4) Sulfur-hydrogen

The TGA curve is a plot of : 29.

- (1) Weight vs voltage
- (3) Weight vs current (4) Weight vs temperature

Which property of nuclei is essential for them to be NMR active ? 30.

- (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

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- (2) Weight vs volume of titrant

- **32.** Which gas is used in gas chromatographic technique ? (2) Chlorine (1) Oxygen (4) Sulphur dioxide (3) Helium **33.** Hydrogen bonding in organic compounds shifts the ultraviolet absorptions to : (2) shorter wavelength (1) shorter frequencies (4) higher wavelength (3) remain unchanged 34. The fingerprint region in IR spectroscopy is in the range of : (2)  $400-1400 \text{ cm}^{-1}$ (1)  $400-800 \text{ cm}^{-1}$ (4)  $2800-3500 \text{ cm}^{-1}$ (3)  $1500-2000 \text{ cm}^{-1}$ McLafferty rearrangement ion peak in the mass spectrum is usually the basic peak for : (2) alcohols (1) amines (4) aldehydes (3) amides 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 determination of large biomolecules using mass spectrometry ? (2) Chemical ionization (4) None of the above (3) MALDI (2) Current (1) Paper (4) Capillary
- The principle of paper chromatography is : 39.
  - (1) Adsorption (2) Partition
  - (3) Ion exchange (4) Affinity

40. Indicate the HPLC detector that is most sensitive to changes in temperature :

- (2) Refractive Index detector (1) PDA detector
- (4) Electrochemical detector (3) UV/V is detector

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P. T. O.

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35.

- Which of the following is NOT true about the guard column used in liquid 36. chromatography?
  - (1) It allows particles that cause precipitation upon contact with stationary or mobile
- Which of the following ionization techniques is used in molecular weight 37.
  - (1) Electron impact

Which of the following is NOT a type of electrophoresis technique ? 38.

(3) Zone

41.	NDA is filled at which of the following s	stage	es?
	(1) Before Phase I	(2)	A fter Phase III
	(3) During preclinical stages	(4)	After Phase II
42.	An unequal distribution of color on the s	urfa	ce of the tablet is called :
	(1) Cracking	(2)	Chipping
	(3) Picking	(4)	Mottling
43.	Nanoparticles are defined as particles wi	th 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 proces	ss co	olorant is used :
	(1) Sealing	(2)	Syrup-coating
	(3) Sub-coating	(4)	Polishing
45.	Which of the following capsule sizes acc	comr	nodates the highest volume ?
	(1) 0	(2)	1
	(3) 5	(4)	000
46.	The following tests are necessary for the	qua	lity testing of parenteral EXCEPT :
	(1) Pyrogen test	(2)	Leaker test
	(3) Sterility test	(4)	Conductivity test
47.	The antimicrobial agent used in the opht	haln	nic solution is :
	(1) Benzalkonium chloride		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		Class 10000 area
50.	The following is NOT used as a measure	. ,	
	(1) Compressibility index		Hausner's ratio
	(3) Angle of repose	• • •	Bulk density
		$\langle \cdot \rangle$	

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Α

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

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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  $\sigma$  bond rotates about the bond axis, orbital overlap is lost.
- (4) When one of two atoms connected by a  $\pi$  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 <sub>3</sub>	(3) $CH_2CI$
(3) CH <sub>2</sub> OH	(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

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68. Which is an example of a prodrug that requires enzymatic activation ? (1) Paracetamol (3) Metformin **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

(2) Enalapril

(4) Propranolol

70. Which anti-viral agent is a symmetrical tricyclic primary amine?

- (1) Amantadine (2) Zanamivir
- (4) All of the above (3) Acyclovir
- **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]

- (2) P and R (1) P and Q
- (4) R and S (3) Q and S

73. Which of the following receptors shows the slowest response ?

- (1) GPCR (2) Ion channel
- (3) Nicotinic (4) Steroid hormone

74. Which of the following is NOT an example of reversible anticholinesterases ?

- (2) Edrophonium (1) Physostigmine
- (4) Donepezil (3) Malathion
- 75. Bioavailability of drug refers to :
  - (1) Percentage of administered dose that reaches systemic circulation
  - (2) Ratio of oral to parenteral dose
  - (3) Ratio of the orally administered drug to that excreted in the faeces
  - (4) Ratio of drug excreted unchanged in urine to that excreted as metabolites

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P. T. O.

Α

- 76. High plasma protein binding :
  - (1) Increases the volume of distribution of the drug
  - (2) Facilitates glomerular filtration of the drug
  - (3) Minimises drug interactions
  - (4) Makes the drug long-acting
- 77. The following receptor is NOT linked to CNS functions :
  - (1) Histamine H<sub>1</sub> (2) Histamine H<sub>2</sub>
  - (3) Serotonin (4) GABA
- 78. Which of the following is NOT a Phase II reaction ?
  - (1) Sulfation (2) Hydrolysis
  - (3) Methylation (4) Glucuronidation
- Which parameter is critical in toxicokinetics to determine the risk of toxicity ? 79.
  - (1) Maximum tolerated dose (MTD)
  - (2) Therapeutic index
  - (3) Volume of distribution  $(V_d)$
  - (4) Area under the plasma concentration-time curve (AUC)

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
- The enzyme catechol-O-methyltransferase (COMT) is primarily involved in : 81.
  - (1) Synaptic reuptake of dopamine
  - (3) Degradation of catecholamines
- The following receptor type is both ligand-gated and voltage-dependent : 82.
  - (1) AMPA
  - (3) NMDA (4) Metabotropic glutamate

### Which of the following neurotransmitters does NOT have a reuptake mechanism as its 83.

(1) Acetylcholine (3) Norepinephrine

- (2) Dopamine
- (4) Serotonin

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- (2) Increasing catecholamines
- (4) Activation of norepinephrine
- - (2) Kainate

Α

84.	A drug with a hi	gh volume of	distribution	$(V_d)$	indicates t	hat 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 (2) 25
- (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

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

- 93. Which active constituent is predominantly found in Senna?
  - (2) Anthraquinones (1) Reservine
  - (3) Atropine

94. Identification of drugs based on its taste and smell is :

- (1) Organoleptic evaluation
- (2) Physical evaluation

(4) Quinine

- (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?

- (2) Guggulu (1) Churna
- (4) Bhasma (3) Arishta/Asava
- The agar diffusion method is commonly employed for 98.
  - (2) Antimicrobial activity (1) Hepatoprotective activity
  - (4) Cardiovascular activity (3) Anti-inflammatory activity

#### Which bioactive compound in turmeric exhibits potent anti-inflammatory activity ? **99**.

- (2) Curcumin (1) Eugenol
- (4) Catechin (3) Resveratrol

### 100. What is the principal biological activity of morphine, an alkaloid derived from opium?

(1) Antimicrobial

(3) Anticancer

(2) Analgesic (4) Anti-inflammatory

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

В

- 1. Alkalinisation of urine hastens the excretion of :
  - (1) Weakly basic drugs (2) Weakly acidic drugs
  - (3) Strong electrolytes (4) Nonpolar drugs
- 2. 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
  - (3) Q and S (4) R and S
- 3. Which of the following receptors shows the slowest response ?
  - (1) GPCR (2) Ion channel
  - (3) Nicotinic (4) Steroid hormone

4. Which of the following is NOT an example of reversible anticholinesterases ?

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  - (3) Methylation (4) Glucuronidation

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

	<ul> <li>9. Which parameter is critical in toxicokit</li> <li>(1) Maximum tolerated dose (MTD)</li> <li>(2) Therapeutic index</li> <li>(3) Volume of distribution (V<sub>d</sub>)</li> <li>(4) Area under the plasma concentration</li> </ul>	netics to determine the risk of toxicity ? on-time curve (AUC)
10	<ol> <li>Which of the following is NOT a chara (1) Activation involves G-proteins</li> <li>(2) Responses are slower but prolonge</li> <li>(3) Directly regulate ion channels</li> <li>(4) Can activate second messenger cas</li> </ol>	d
11	<ul> <li>Schedule X of the Drugs and Cosmetic</li> <li>(1) List of incurable diseases</li> <li>(3) List of generic drugs</li> </ul>	s Act comprises : (2) Guidelines for clinical trials (4) Narcotic and psychotropic drugs
12.	<ul> <li>The first edition of Indian Pharmacopoe</li> <li>(1) 1940</li> <li>(3) 1955</li> </ul>	eia was published in the year : (2) 1950 (4) 1985
13.	<ul><li>Which of the following devices/techn system category ?</li><li>(1) Micelles and dendrimers</li><li>(3) Matrix patches</li></ul>	(2) Liposomes (4) Nanoparticles
14.	The maximum pressure to be filled in provide the provided of the filled in provide the filled in providet the	lastic aerosol containers is : (2) 50 psi (4) 15 psi
15.	<ul><li>Which among the following is NOT use</li><li>(1) Abrasive</li><li>(3) Binder</li></ul>	d in a toothpaste : (2) Humectant (4) Glidant
16.	<ul><li>The heterocyclic nucleus present in Cim</li><li>(1) Imidazole</li><li>(3) Thiazole</li></ul>	etidine is : (2) Benzimidazole (4) None of the above
17.	<ul><li>Ing's Rule of Five is associated with :</li><li>(1) Cholinergic drugs</li><li>(3) Antihistaminics</li></ul>	<ul><li>(2) Adrenergic drugs</li><li>(4) Oral anticoagulants</li></ul>

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18.	What is the parent heterocyclic nucleus (1) Quinoline (3) Pyrrole	oresent in anti-hypertensive drug clonidine? (2) Imidazole (4) Pyrazole
19.	<ul><li>Which of the following antidepressant data</li><li>(1) Imipramine</li><li>(3) Doxepin</li></ul>	rugs is having dibenzazepine skeleton ? (2) Amitriptyline (4) Chlorpromazine
20.	Pregnanes are steroid having	carbon atoms (2) 20 (4) 18
21.	<ul> <li>Signal splitting in NMR arises from :</li> <li>(1) Shielding effect</li> <li>(3) Spin-spin coupling</li> </ul>	<ul><li>(2) Spin-spin decoupling</li><li>(4) Deshielding effect</li></ul>
22.	<ul><li>Which gas is used in gas chromatograph</li><li>(1) Oxygen</li><li>(3) Helium</li></ul>	ic technique ? (2) Chlorine (4) Sulphur dioxide
23.	<ul><li>Hydrogen bonding in organic compound</li><li>(1) shorter frequencies</li><li>(3) remain unchanged</li></ul>	s shifts the ultraviolet absorptions to : (2) shorter wavelength (4) higher wavelength
24.	The fingerprint region in IR spectroscopy (1) 400-800 cm <sup>-1</sup> (3) 1500-2000 cm <sup>-1</sup>	y is in the range of : (2) $400-1400 \text{ cm}^{-1}$ (4) $2800-3500 \text{ cm}^{-1}$
25.	McLafferty rearrangement ion peak in th (1) amines (3) amides	e mass spectrum is usually the basic peak for : (2) alcohols (4) aldehydes
26.	chromatography ?	column
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27.	<ul><li>Which of the following ionization determination of large biomolecules usin</li><li>(1) Electron impact</li><li>(3) MALDI</li></ul>	techniques is used in molecular weight ig mass spectrometry ? (2) Chemical ionization (4) None of the above
28.	<ul><li>Which of the following is NOT a type of</li><li>(1) Paper</li><li>(3) Zone</li></ul>	electrophoresis technique ? (2) Current (4) Capillary
29.	<ul><li>The principle of paper chromatography i</li><li>(1) Adsorption</li><li>(3) Ion exchange</li></ul>	s : (2) Partition (4) Affinity
30.	<ul><li>Indicate the HPLC detector that is most s</li><li>(1) PDA detector</li><li>(3) UV/V is detector</li></ul>	sensitive to changes in temperature : (2) Refractive Index detector (4) Electrochemical detector
31.	<ul><li>Chi-square test was developed by :</li><li>(1) W. S. Gosset</li><li>(3) A. R. Fisher</li></ul>	<ul><li>(2) Karl Pearson</li><li>(4) Pascal</li></ul>
32.	<ul><li>Which of the following is a measure of v</li><li>(1) Standard Deviation</li><li>(3) Mode</li></ul>	variation ? (2) Midrange (4) Median
33.	The student's t-test is : (1) a statistical test (3) a clinical test	<ul><li>(2) a non-statistical test</li><li>(4) a biometric test</li></ul>
34.	<ul> <li>Which of the following is NOT a princip</li> <li>(1) The importance of research must out</li> <li>(2) Participants must give informed cons</li> <li>(3) Research should only be conducted of</li> <li>(4) Vulnerable groups require additional</li> </ul>	sent on animals, not humans
35.	(3) Council for Preservation of Careful S	ol and Supervision of Experiments on Animals
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- **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

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42.	. Cinchona bark is primarily used for	r its :
	(1) Antidiabetic activity	(2) Antimalarial property
	(3) Laxative action	(4) Cardioprotective effect
43.	Which active constituent is predom	inantly found in Senna ?
	(1) Reserpine	(2) Anthraquinones
	(3) Atropine	(4) Quinine
44.	Identification of drugs based on its	taste and smell is :
	(1) Organoleptic evaluation	(2) Physical evaluation
	(3) Chemical Evaluation	(4) Microscopical evaluation
45.	Palisade ratio is :	
	(1) Total number of palisade cells b	peneath each epidermal cell
	(2) Total number of Palisade cells b	peneath mesophyll
	(3) Average number of Palisade cel	ls beneath each epidermal cell
		ls beneath four continuous epidermal cells
46.	statements are frue to	r alkaloids EXCEPT :
	(1) Alkaloids are polyphenolic com	pounds
	(2) Alkaloids are basic	
	<ul><li>(3) Alkaloids are derived from amin</li><li>(4) Alkaloids are derived from amin</li></ul>	
	(4) Alkaloids are secondary metabo	
47.	Which Ayurvedic preparation involv	es fermentation and contains natural alcohol?
	<ol> <li>(1) Churna</li> <li>(3) Arishta/Asaya</li> </ol>	(2) Guggulu
		(4) Bhasma
48.	The agar diffusion method is commo	nly employed for
	(1) Hepatoprotective activity	(2) Antimicrobial activity
	(3) Anti-inflammatory activity	(4) Cardiovascular activity
49.	Which bioactive compound in turmer	tic exhibits potent anti-inflammatory activity ?
		(2) Curcumin
	(3) Resveratrol	(4) Catechin
50.	What is the principal biological activi	ty of morphine, an alkaloid derived from opium?
		(2) Analgesic
	(3) Anticancer	(4) Anti-inflammatory

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- 51. 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  $\sigma$  bond rotates about the bond axis, orbital overlap is lost.
  - (4) When one of two atoms connected by a  $\pi$  bond rotates about the bond axis, orbital overlap is lost.
- 52. The following is NOT an example of alkylating agents (anti-neoplastic) :
  - Methotrexate
     Busulfan
     Carmustine
     Cisplatin
- **53.** Following is an example of fluoroquinolones :
  - (1) Ofloxacin
     (2) Chloramphenicol
     (3) Azithromycin
     (4) Ampicillin
- 54. Which of the following groups has the highest priority according to the Cahn-Ingold-Prelog sequence rules ?
  - (1)  $CH_3$  (3)  $CH_2CI$ (3)  $CH_2OH$  (4) CHO
- **55.** What is the term for molecules that are non-superimposable mirror images of each other ?
  - (1) Diastereomers
     (2) Enantiomers
     (3) Isotopes
     (4) Conformers
- **56.** 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
- 57. Identify the oral anticoagulant among the following :
  - (1) Heparin
     (2) Fondaparinux
     (3) Warfarin
     (4) Lepirudin
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58.	Which is an example of a prodrug that re (1) Paracetamol (3) Metformin	equires enzymatic activation ? (2) Enalapril (4) Propranolol	
59.	<ul> <li>What is post-precipitation ?</li> <li>(1) Precipitation of the main analyte at the second s</li></ul>	main precipitate has formed on	
60.	<ul><li>Which anti-viral agent is a symmetrical</li><li>(1) Amantadine</li><li>(3) Acyclovir</li></ul>	tricyclic primary amine ? (2) Zanamivir (4) All of the above	
61.	<ul><li>The enzyme catechol-O-methyltransfera</li><li>(1) Synaptic reuptake of dopamine</li><li>(3) Degradation of catecholamines</li></ul>	use (COMT) is primarily involved in : (2) Increasing catecholamines (4) Activation of norepinephrine	
62.	The following receptor type is both ligar (1) AMPA (3) NMDA	nd-gated and voltage-dependent : (2) Kainate (4) Metabotropic glutamate	
63.	<ul><li>Which of the following neurotransmitter</li><li>primary mode of termination ?</li><li>(1) Acetylcholine</li><li>(3) Norepinephrine</li></ul>	rs does NOT have a reuptake mechanism as its (2) Dopamine (4) Serotonin	
64.	<ul> <li>A drug with a high volume of distribution</li> <li>(1) Remains primarily in the plasma</li> <li>(2) Distributes extensively into tissues</li> <li>(3) Rapidly excreted by the kidneys</li> <li>(4) Undergoes extensive first-pass meta</li> </ul>		
65.	The half-life (t <sub>1/2</sub> ) of a toxicant is directly (1) Clearance (CL) (3) Absorption rate	y proportional to its : (2) Volume of distribution (V <sub>d</sub> ) (4) Plasma concentration	
66.	In Lycopodium spore method number is	of characteristic structures in fields selected	

- (1) 20 (2) 43 (3) 25 (4) 56
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Which among the following is NOT a leaf constant? 67. (2) Stomatal index (1) Palisade ratio (4) Vein-Islet Number (3) Carr index Which of the following pair of alkaloids are volatile? 68. (2) Atropine and quinine (1) Morphine and papaverine (4) None of these (3) Nicotine and coniine **69.** Identify the drug/plant containing Withanine : (2) Cinchona (1) Ashwagandha (3) Ergot (4) Opium 70. Which test is used to detect the presence of alkaloids in a plant extract ? (2) Dragendroff's test (1) Borntrager's test (3) Molisch test (4) Biuret's test **71.** NDA is filled at which of the following stages ? (2) A fter Phase III (1) Before Phase I (4) After Phase II (3) During preclinical stages 72. An unequal distribution of color on the surface of the tablet is called : (1) Cracking (2) Chipping (4) Mottling (3) Picking Nanoparticles are defined as particles with a size range of : 73. (2) 100-1000 nm (1) 1-100 nm (4) 10-100 μm (3) 1-10 µm 74. In which step of the sugar-coating process colorant is used : (1) Sealing (2) Syrup-coating (4) Polishing (3) Sub-coating Which of the following capsule sizes accommodates the highest volume? 75. (2) 1 (1) 0(4) 000(3) 5 The following tests are necessary for the quality testing of parenteral EXCEPT : 76.

(2) Leaker test (1) Pyrogen test (4) Conductivity test (3) Sterility test

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77.	The antimicrobial agent used in the op	
	(1) Benzalkonium chloride	(2) Salicylic acid
	(3) Sodium bicarbonate	(4) PEG 4000
78.	The test animal used for pyrogen testi	ng is :
	(1) Rat	(2) Mice
	(3) Rabbit	(4) Guinea pig
79.	The aseptic area is :	
	(1) Class 100 area	(2) Class 1000 area
	(3) Class 10 area	(4) Class 10000 area
80.	The following is NOT used as a measu	re of the flow property of the powder :
	(1) Compressibility index	(2) Hausner's ratio
	(3) Angle of repose	(4) Bulk density
81.	Which phase of clinical trials has the s	,
	(1) Phase II	(2) Phase I
	(3) Phase IV	(4) Phase III
82.	Clinical trials in India are governed by	
	(1) NIH	which regulatory body ?
	(2) CPCSEA	
	(3) Ministry of Science and Technolog	
	(4) Central Drugs Standard Control Or	ganization (CDSCO)
83.	What does a p-value less than 0.05 indi	cate in a test of significance 2
	(1) The null hypothesis is true	
	(2) The result is statistically significant	
	<ul><li>(3) The sample size is too small</li><li>(4) There is no relationships</li></ul>	
	(4) There is no relationship between va	
84.	Which of the following tests is most related samples ?	appropriate for comparing the means of two
	(1) F-test	(2) One-way ANOYA
	(3) Paired t-test	(4) Chi-square test
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	85. 86.	<ul> <li>Blinding may be :</li> <li>(1) Single-blind</li> <li>(3) Triple-blind</li> <li>Which of the following is NOT a thermat</li> <li>(1) Thermocouple</li> <li>(3) Bolometer</li> </ul>	<ul> <li>(2) Double-blind</li> <li>(4) Any of the above</li> <li>al detector used in IR spectroscopy ?</li> <li>(2) Photoconductive detector</li> <li>(4) Pyroelectric detector</li> </ul>		
2	87.	In IR spectra, C-H stretching of aldehyde (1) 2850-2750 cm <sup>-1</sup> (3) 2250-2150 cm <sup>-1</sup>	(2) $1750-1725 \text{ cm}^{-1}$ (4) $2100 \text{ cm}^{-1}$		
,	88.	<ul><li>Which of the following bonds would sho</li><li>(1) Carbon-hydrogen</li><li>(3) Nitrogen-hydrogen</li></ul>	ow the strongest absorption in the IR ? (2) Oxygen-hydrogen (4) Sulfur-hydrogen		
1	89.	<ul><li>The TGA curve is a plot of :</li><li>(1) Weight vs voltage</li><li>(3) Weight vs current</li></ul>	<ul><li>(2) Weight vs volume of titrant</li><li>(4) Weight vs temperature</li></ul>		
	90.	<ul><li>Which property of nuclei is essential for</li><li>(1) Even number of protons and neutrons</li><li>(3) High atomic mass</li></ul>	<ul><li>them to be NMR active ?</li><li>(2) Non-zero nuclear spin</li><li>(4) High electronegativity</li></ul>		
	91.	(1) A technique for collecting data	nich of the following statements is INCORRECT about a questionnaire ? A technique for collecting data Large amounts of information can be collected It's quick and easy to collect results		
	92.	<ul> <li>Identify the WRONG statement :</li> <li>(1) Meta-analysis is a type of review usi</li> <li>(2) Literature reviews can also report ne</li> <li>(3) Literature reviews are common in res</li> <li>(4) The main types of narrative reviews</li> </ul>	ew/original experiment work		

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

93.	Preliminary data collection is a part of	the research		
	(1) Qualitative	(2) Exploratory		
	(3) Explanatory	(4) Correlational research		
94.	<ul> <li>Identify the WRONG statement :</li> <li>(1) Too large sample size is unethical and unnecessary</li> <li>(2) Sampling errors can't be eased by sample size</li> <li>(3) Too small sample is unscientific</li> </ul>			
	(4) Necessary sample size can be calcu	lated using statistical software		
95.				
	A subset that is chosen from a large po- (1) Parameter	(2) Variable		
	(3) Sample	(4) Statistic		
96.				
50.	Who provided the Helsinki Declaration for the guidance of the medical research community?			
	(1) WHO	(2) UNO		
	(3) OIC	(4) World Medical Association		
97.	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		
98.	Which test is the part of the parametric test ?			
	(1) Sign Test	(2) Run Test for Randomness		
	(3) Kruskal- Willis Test	(4) z-test		
99.	Which of the following is a random sampling method?			
	(1) Cluster sampling	(2) Quota sampling		
	(3) Convenience sampling	(4) Snowball sampling		
100.	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		

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Date of Examination		

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- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
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1.	1. NDA is filled at which of the following stages ?				
	(1) Before Phase I	(2)	A fter Phase III		
	(3) During preclinical stages	(4)	After Phase II		
2. An unequal distribution of color on the surface of the tablet i			ce of the tablet is called :		
	(1) Cracking	(2)	Chipping		
	(3) Picking	(4)	Mottling		
3.	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		
4. In which step of the sugar-coating proc			cess colorant is used :		
	(1) Sealing	(2)	Syrup-coating		
	(3) Sub-coating	(4)	Polishing		
5.	. Which of the following capsule sizes accommodates the highest volume				
	(1) 0	(2)	-		
	(3) 5	(4)	000		
6. The following tests are necessary for the quality testing			ity testing of parenteral EXCEPT :		
	(1) Pyrogen test		Leaker test		
	(3) Sterility test	(4)	Conductivity test		
7.	The antimicrobial agent used in the ophthalmic solution is :		ic solution is :		
	(1) Benzalkonium chloride		Salicylic acid		
	(3) Sodium bicarbonate	(4)	PEG 4000		
8.	The test animal used for pyrogen testing is :				
	(1) Rat		Mice		
	(3) Rabbit	(4)	Guinea pig		
9.	The aseptic area is :				
	(1) Class 100 area	(2)	Class 1000 area		
	(3) Class 10 area	(4)	Class 10000 area		
10.	The following is NOT used as a measure of the flow property of the powder				
	(1) Compressibility index		Hausner's ratio		
	(3) Angle of repose		Bulk density		

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

- 11. Which phase of clinical trials has the smallest population size?
  - (1) Phase II (2) Phase I
  - (3) Phase IV (4) Phase III
- **12.** 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)
- **13.** 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
- **14.** Which of the following tests is most appropriate for comparing the means of two related samples ?
  - (1) F-test (2) One-way ANOYA
  - (3) Paired t-test (4) Chi-square test
- 15. Blinding may be :
  - (1) Single-blind (2) Double-blind
  - (3) Triple-blind (4) Any of the above
- 16. Which of the following is NOT a thermal detector used in IR spectroscopy ?
  - (1) Thermocouple (2) Photoconductive detector
  - (3) Bolometer (4) Pyroelectric detector

**17.** 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)  $2100 \text{ cm}^{-1}$
- (3)  $2250-2150 \text{ cm}^{-1}$  (4)  $2100 \text{ cm}^{-1}$
- **18.** 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

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- The TGA curve is a plot of : 19.
  - (1) Weight vs voltage
  - (3) Weight vs current
- Which property of nuclei is essential for them to be NMR active ? 20.
  - (1) Even number of protons and neutrons (2) Non-zero nuclear spin
  - (4) High electronegativity (3) High atomic mass
- Which of the following statements is INCORRECT about a questionnaire ? 21.
  - (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
- **22.** 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

23. Preliminary data collection is a part of the ..... research

- (2) Exploratory (1) Qualitative
- (4) Correlational research (3) Explanatory

#### Identify the WRONG statement : 24.

- (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

25. A subset that is chosen from a large population ?

- (2) Variable (1) Parameter
- (4) Statistic (3) Sample
- Who provided the Helsinki Declaration for the guidance of the medical research 26. community?
  - (1) WHO (2) UNO (3) OIC
    - (4) World Medical Association

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- (2) Weight vs volume of titrant
- (4) Weight vs temperature

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27	the ethics & philosophical implications of certain technologies & treatments is called				
	(1) Bio-medics	(2) Biotechnology			
	(3) Biology	(4) Bioethics			
28	<b>3.</b> Which test is the part of the param	Which test is the part of the parametric test ?			
	(1) Sign Test	(2) Run Test for Randomness			
	(3) Kruskal- Willis Test	(4) z-test			
29	<b>9.</b> Which of the following is a rando	m sampling method ?			
	(1) Cluster sampling	(2) Quota sampling			
	(3) Convenience sampling	(4) Snowball sampling			
30	<b>D.</b> In a one-way ANOVA, the "one-w	vay" refers to			
	(1) One dependent variable	(2) One level of measurement			
	(3) One independent variable	(4) One constant			
3-	1. Mark the pseudoalkaloids from th	Mark the pseudoalkaloids from the following			
	(1) Atropine	(2) Theophylline			
	(3) Adrenaline	(4) Morphine			
32	2. Cinchona bark is primarily used for	or its :			
	(1) Antidiabetic activity	(2) Antimalarial property			
	(3) Laxative action	(4) Cardioprotective effect			
3	3. Which active constituent is predominantly found in Senna?				
	(1) Reserpine	(2) Anthraquinones			
	(3) Atropine	(4) Quinine			
3	Identification of drugs based on its taste and smell is :				
	(1) Organoleptic evaluation	(2) Physical evaluation			
	(3) Chemical Evaluation	(4) Microscopical evaluation			
3	<b>5.</b> Palisade ratio is :				
	(1) Total number of palisade cells beneath each epidermal cell				
(2) Total number of Palisade cells beneath mesophyll					
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(4) Average number of Palisade cells beneath four continuous epidermal cells

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

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36.

(1) Alkaloids are polyphenolic compounds (2) Alkaloids are basic (3) Alkaloids are derived from amino acids (4) Alkaloids are secondary metabolites 37. Which Ayurvedic preparation involves fermentation and contains natural alcohol ? (2) Guggulu (1) Churna (4) Bhasma (3) Arishta/Asava 38. The agar diffusion method is commonly employed for (2) Antimicrobial activity (1) Hepatoprotective activity (4) Cardiovascular activity (3) Anti-inflammatory activity 39. Which bioactive compound in turmeric exhibits potent anti-inflammatory activity ? (2) Curcumin (1) Eugenol (4) Catechin (3) Resveratrol 40. What is the principal biological activity of morphine, an alkaloid derived from opium ? (2) Analgesic (1) Antimicrobial (4) Anti-inflammatory (3) Anticancer 41. 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  $\sigma$  bond rotates about the bond axis, orbital overlap is lost. (4) When one of two atoms connected by a  $\pi$  bond rotates about the bond axis, orbital overlap is lost. The following is NOT an example of alkylating agents (anti-neoplastic) : 42. (2) Busulfan (1) Methotrexate (4) Cisplatin (3) Carmustine **43.** Following is an example of fluoroquinolones : (1) Ofloxacin (2) Chloramphenicol (3) Azithromycin (4) Ampicillin Ph. D.-EE-December, 2024/(Pharmaceutical Science)(SET-Y)/(C)

The following statements are true for alkaloids EXCEPT :

- 44. Which of the following groups has the highest priority according to the Cahn-Ingold-Prelog sequence rules?
  - (3) CH<sub>2</sub>CI (1) CH<sub>3</sub> (4) CHO (3) CH<sub>2</sub>OH
- 45. What is the term for molecules that are non-superimposable mirror images of each other?
  - (2) Enantiomers (1) Diastereomers
  - (4) Conformers (3) Isotopes
- 46. 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
- **47.** Identify the oral anticoagulant among the following :
  - (2) Fondaparinux (1) Heparin
  - (4) Lepirudin (3) Warfarin

Which is an example of a prodrug that requires enzymatic activation ? 48.

- (2) Enalapril (1) Paracetamol
- (4) Propranolol (3) Metformin
- **49.** 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

50. Which anti-viral agent is a symmetrical tricyclic primary amine ?

- (2) Zanamivir (1) Amantadine
- (3) Acyclovir
- 51. Signal splitting in NMR arises from :
  - (1) Shielding effect
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### Ph. D.-EE-December, 2024/(Pharmaceutical Science)(SET-Y)/(C)

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- (4) All of the above
- (2) Spin-spin decoupling

С

- 52. Which gas is used in gas chromatographic technique ?
  - (1) Oxygen (2) Chlorine
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- (3) MALDI (4) None of the above
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(1) Paper	(2)	Current

- (3) Zone (4) Capillary
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  - (3) UV/V is detector (4) Electrochemical detector

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

(3) Strong electrolytes 62. The following drugs have more than 99% protein-binding capacity Digoxin [P]; Aspirin [Q]; Thyroxine [R]; Warfarin [S] . (1) P and O(2) P and R (3) Q and S (4) R and S 63. Which of the following receptors shows the slowest response ? (1) GPCR (2) Ion channel (3) Nicotinic (4) Steroid hormone 64. Which of the following is NOT an example of reversible anticholinesterases ? (1) Physostigmine (2) Edrophoniurn (3) Malathion (4) Donepezil 65. Bioavailability of drug refers to : (1) Percentage of administered dose that reaches systemic circulation (2) Ratio of oral to parenteral dose (3) Ratio of the orally administered drug to that excreted in the faeces (4) Ratio of drug excreted unchanged in urine to that excreted as metabolites 66. High plasma protein binding : (1) Increases the volume of distribution of the drug (2) Facilitates glomerular filtration of the drug (3) Minimises drug interactions (4) Makes the drug long-acting

67. The following receptor is NOT linked to CNS functions :

- (1) Histamine  $H_1$ (2) Histamine  $H_2$
- (3) Serotonin (4) GABA
- 68. Which of the following is NOT a Phase II reaction ?
  - (1) Sulfation (2) Hydrolysis
  - (3) Methylation (4) Glucuronidation

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

- 61. Alkalinisation of urine hastens the excretion of :

  - (2) Weakly acidic drugs (1) Weakly basic drugs
    - (4) Nonpolar drugs

С

- 69. Which parameter is critical in toxicokinetics to determine the risk of toxicity ?
  - (1) Maximum tolerated dose (MTD)
  - (2) Therapeutic index
  - (3) Volume of distribution  $(V_d)$
  - (4) Area under the plasma concentration-time curve (AUC)

### 70. 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
- 71. 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
- 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

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

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77.	<ul><li>Which among the following is NOT a lea</li><li>(1) Palisade ratio</li><li>(3) Carr index</li></ul>	(2)	onstant ? Stomatal index Vein-Islet Number
<b>78.</b>	<ul><li>Which of the following pair of alkaloids</li><li>(1) Morphine and papaverine</li><li>(3) Nicotine and coniine</li></ul>	(2)	volatile ? Atropine and quinine None of these
79.	<ul><li>Identify the drug/plant containing Withau</li><li>(1) Ashwagandha</li><li>(3) Ergot</li></ul>	(2)	: Cinchona Opium
80.	<ul><li>Which test is used to detect the presence</li><li>(1) Borntrager's test</li><li>(3) Molisch test</li></ul>	(2)	lkaloids in a plant extract ? Dragendroff's test Biuret's test
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83.	The student's t-test is : (1) a statistical test (3) a clinical test		a non-statistical test a biometric test
84.			
85. Ph. D	<ul> <li>What does CPCSEA stand for ?</li> <li>(1) Committee for Protection of Controlled Species in Experimental Animals</li> <li>(2) Committee for the Purpose of Control and Supervision of Experiments on Animals</li> <li>(3) Council for Preservation of Careful Study of Experimental Animals</li> <li>(4) Commission for Planning and Certification of Scientific Experiments on Animals</li> </ul>		

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- **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
- 87. 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
- **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
  - (3) Decapitation without sedation
  - (4) Electrocution
- **89.** Phase  $\Pi$  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
- 90. Informed consent ensures that :
  - (1) Participants are fully aware of the risks, benefits, and purpose of the study
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  - (1) List of incurable diseases (2) Guidelines for clinical trials
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### Ph. D.-EE-December, 2024/(Pharmaceutical Science)(SET-Y)/(C)

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92. The first edition of Indian Pharmacopoeia was published in the year :

The first cutton of mutan r narmacopo	
(1) 1940	(2) 1950
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93. Which of the following devices/techniques is under the transdermal drug delivery system category ?

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**96.** The heterocyclic nucleus present in Cimetidine is :

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  - (4) None of the above
- **97.** Ing's Rule of Five is associated with :
  - (1) Cholinergic drugs (2) Adrenergic drugs
  - (3) Antihistaminics (4) Oral anticoagulants

**98.** What is the parent heterocyclic nucleus present in anti-hypertensive drug clonidine ?

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**99.** Which of the following antidepressant drugs is having dibenzazepine skeleton ?

- (1) Imipramine (2) Amitriptyline (3) Doxepin
  - (4) Chlorpromazine
- **100.** Pregnanes are steroid having ..... carbon atoms
  - (1) 21 (2) 20
  - (3) 19 (4) 18

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	ARE ASKED TO DO SO)	SET-Y		
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	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)

Total No. of Printed Pages : 13

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#### 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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SEAL

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

- 2
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Ph. D	EE-December, 2024/(Pharmaceutical	Science)(SET-Y)/(D)	P. T. O.

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

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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

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- Which phase of clinical trials has the smallest population size ? 51.
  - (2) Phase I (1) Phase II
  - (4) Phase III (3) Phase IV
- Clinical trials in India are governed by which regulatory body ? 52.
  - (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?
  - (2) One-way ANOYA (1) F-test
  - (4) Chi-square test (3) Paired t-test
- 55. Blinding may be :
  - (2) Double-blind (1) Single-blind
  - (4) Any of the above (3) Triple-blind
- Which of the following is NOT a thermal detector used in IR spectroscopy ? 56.
  - (2) Photoconductive detector (1) Thermocouple
  - (4) Pyroelectric detector (3) Bolometer
- 57. In IR spectra, C-H stretching of aldehyde is at :
  - (2)  $1750-1725 \text{ cm}^{-1}$ (1) 2850-2750  $\mathrm{cm}^{-1}$ (4)  $2100 \text{ cm}^{-1}$
  - (3) 2250-2150 cm<sup>-1</sup>

58. Which of the following bonds would show the strongest absorption in the IR ?

(2) Oxygen-hydrogen (1) Carbon-hydrogen (4) Sulfur-hydrogen (3) Nitrogen-hydrogen

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59.	<ul><li>The TGA curve is a plot of :</li><li>(1) Weight vs voltage</li><li>(3) Weight vs current</li></ul>	<ul><li>(2) Weight vs volume of titrant</li><li>(4) Weight vs temperature</li></ul>
60.	<ul><li>Which property of nuclei is essential for</li><li>(1) Even number of protons and neutrons</li><li>(3) High atomic mass</li></ul>	them to be NMR active ?
<b>61.</b>	<ul><li>NDA is filled at which of the following s</li><li>(1) Before Phase I</li><li>(3) During preclinical stages</li></ul>	tages ? (2) A fter Phase III (4) After Phase II
62.	<ul><li>An unequal distribution of color on the s</li><li>(1) Cracking</li><li>(3) Picking</li></ul>	urface of the tablet is called : (2) Chipping (4) Mottling
63.	<ul> <li>Nanoparticles are defined as particles wi</li> <li>(1) 1-100 nm</li> <li>(3) 1-10 μm</li> </ul>	th a size range of : (2) 100-1000 nm (4) 10-100 μm
64.	In which step of the sugar-coating proces (1) Sealing (3) Sub-coating	•
65.	<ul><li>Which of the following capsule sizes acc</li><li>(1) 0</li><li>(3) 5</li></ul>	e
66.	<ul><li>The following tests are necessary for the</li><li>(1) Pyrogen test</li><li>(3) Sterility test</li></ul>	
67.	<ul><li>The antimicrobial agent used in the ophth</li><li>(1) Benzalkonium chloride</li><li>(3) Sodium bicarbonate</li></ul>	
68.	The test animal used for pyrogen testing (1) Rat (3) Rabbit	

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- **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  $\sigma$  bond rotates about the bond axis, orbital overlap is lost.
  - (4) When one of two atoms connected by a  $\pi$  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 <sub>2</sub> CI
(3)	CH <sub>2</sub> OH	(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

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- 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
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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 Which test is the part of the parametric test? 88. (1) Sign Test (2) Run Test for Randomness (4) z-test (3) Kruskal- Willis Test 89. Which of the following is a random sampling method ? (1) Cluster sampling (2) Quota sampling (4) Snowball sampling (3) Convenience sampling 90. 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 The enzyme catechol-O-methyltransferase (COMT) is primarily involved in : 91. (1) Synaptic reuptake of dopamine (2) Increasing catecholamines (3) Degradation of catecholamines (4) Activation of norepinephrine The following receptor type is both ligand-gated and voltage-dependent : 92. (2) Kainate (1) AMPA (4) Metabotropic glutamate (3) NMDA

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93.	Which of the following neurotransmitter primary mode of termination ? (1) Acetylcholine	ers does NOT have a reuptake mechanism as its (2) Dopamine
	(3) Norepinephrine	(4) Serotonin
94.	<ul> <li>A drug with a high volume of distribution</li> <li>(1) Remains primarily in the plasma</li> <li>(2) Distributes extensively into tissues</li> <li>(3) Rapidly excreted by the kidneys</li> <li>(4) Undergoes extensive first-pass metal</li> </ul>	· •
95.	The half-life $(t_{1/2})$ of a toxicant is direct	
	(1) Clearance (CL)	(2) Volume of distribution $(V_d)$
	(3) Absorption rate	(4) Plasma concentration
96.	In Lycopodium spore method number is	of characteristic structures in fields selected
	(1) 20	(2) 43
	(3) 25	(4) 56
97.	Which among the following is NOT a le	af 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 Withan	nine :
	(1) Ashwagandha	(2) Cinchona
	(3) Ergot	(4) Opium
100.	Which test is used to detect the presence	
	(1) Borntrager's test	<ul><li>(2) Dragendroff's test</li></ul>
	(3) Molisch test	(1) The second off s lest

(3) Molisch test (4) Biuret's test

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Q. NO.	eys of PH.D (PHARMAC A	В	С	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		2	3	4
9	4	4	1	2
	1			1
10	3	3	4	
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
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20	2	3	4	2
21	4	3	2	4
22		2	2	4
	2			
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28	2	2	4	2
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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
		1	2	1
40	2		3	3
41	2	2		3
42	4	2	1	
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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Q. NO.	А	В	С	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
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59	1	2	2	4
60	1	1	2	2
	3	3	2	2
61		3	4	4
62	1		4 4	1
63	1	1		
64	2	2	3	2
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76	4	4	3	2
77	2	1	3	3
78	2	3	3	2
79	4	1	1	2
		4		1
80 81	3	2	2	4
		4	1	2
82	3			2
83	1	2	1	2
84	2	3	3	
85	2	4	2	3
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		4	1	3
98	3	4	2	3
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