Roll. No								Question Booklet Number
O.M.R. Serial No.								

# M.Sc. (SEM.-III) (NEP) (SUPPLE.) EXAMINATION, 2024-25 MICROBIOLOGY

(Molecular Host Microbe Interactions)

Paper Code
L 0 4 0 9 0 7 T

(Elective)

Question Booklet Series

A

Max. Marks :  $\overline{75}$ 

# Time: 1:30 Hours

Instructions to the Examinee:

- Do not open the booklet unless you are asked to do so.
- The booklet contains 100 questions.
   Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet.
   All questions carry equal marks.
- Examine the Booklet and the OMR
   Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
- 4. Four alternative answers are mentioned for each question as A, B, C & D in the booklet. The candidate has to choose the correct / answer and mark the same in the OMR Answer-Sheet as per the direction:

(Remaining instructions on last page)

## परीक्षार्थियों के लिए निर्देश :

- प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
- 2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
- 3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, उसे तुरन्त बदल लें।
- प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है:

(शेष निर्देश अन्तिम पृष्ठ पर)

1.		portal of entry is primarily used by nella typhi?	ο.	clots around pathogens?		
	(A)	Respiratory tract		(A)	Coagulase	
	(B)	Gastrointestinal tract		(B)	Hyaluronidase	
	(C)	Skin		(C)	Collagenase	
	(D)	Conjunctiva		(D)	Streptokinase	
2.	Which structure on bacterial cells helps in adherence to host tissues?		6.	Endotoxins are primarily associated with:		
				(A)	Gram-positive cell walls	
	(A)	Flagella		(B)	Gram-negative outer membrane (LPS)	
	(B)	Capsules		(C)	Bacterial capsules	
	(C)	Ribosomes		(D)	Bacterial flagella	
3.	(D) Cansul	Fimbriae (pili) es contribute to pathogenicity by:	7.		bacterial component triggers a strong e response causing septic shock?	
<b>.</b>	(A)	Helping in nutrient uptake		(A)	Exotoxin	
	(B)	Facilitating motility		(B)	Capsule	
		·		(C)	Endotoxin (Lipid A)	
	(C)	Preventing phagocytosis		(D)	Teichoic acid	
	(D)	Producing toxins	8.	Helicobacter pylori uses which enzyme to		
4.	Antigenic variation helps pathogens by:		O.	neutralize stomach acid for colonization?		
	(A)	Enhancing phagocytosis		(A)	Hyaluronidase	
	(B)	Promoting biofilm formation		(B)	Urease	
	(C)	Increasing toxin production		(C)	Lipase	
	(D)	Evading immune recognition		(D)	Collagenase	

13. Which of the following is not a common way 9. The function of siderophores in pathogenicity viruses cause disease? is to: (A) Capture iron from host (A) Direct cell lysis (B) Provide motility Induction of tumors (B) (C) Destroy phagocytes Release of endotoxins (C) (D) Enhance capsule production Latent infections (D) 10. Which pathogen uses coagulase to wall 14. Viral spikes (glycoproteins) are primarily itself off from host defenses? responsible for: (A) E. coli (A) Viral genome replication (B) Staphylococcus aureus (B) Host cell recognition and attachment (C) Salmonella typhi Degradation of host DNA (C) Vibrio cholerae (D) (D) Viral release from host cell 11. The toxin responsible for watery diarrhea in cholera is: 15. Which type of viral infection persists in host cells without producing infectious virions? (A) Shiga toxin (A) Latent infection Cholera toxin (B) (C) Botulinum toxin (B) Chronic infection (D) Enterotoxin A (C) Acute infection 12. Which of the following is a mechanism of Cytolytic infection (D) Mycobacterium tuberculosis survival inside 16. Oncogenic viruses can transform normal macrophages? cells into: (A) Antigenic variation

(B)

(C)

(D)

fusion

Capsule-mediated resistance

Inhibition of phagosome-lysosome

Siderophore-mediated iron uptake

Necrotic cells

Macrophages

Lymphocytes

Tumor cells

(A)

(B)

(C)

(D)

17.	Which virus is most strongly associated with cervical cancer?		21.	Which virus is known for producing Negri bodies in neurons?		
	(A)	HIV		(A)	Herpes simplex virus	
	(B)	HPV		(B)	Measles virus	
	(C)	HBV		(C)	Polio virus	
	(D)	HCV		(D)	Rabies virus	
18.	Antigenic drift in influenza virus occurs due to:		22.		formation of host cells into alized cells is a cytopathic effect of:	
	(A)	Gene recombination		(A)	Rotavirus	
	(B)	Host cell apoptosis		(B)	Adenovirus	
	(C)	Integration into host genome		(C)	Retrovirus	
	(D)	Point mutations in HA/NA proteins		(D)	Influenza virus	
19.	Which of the following mechanisms is used by viruses to block host interferon action?		23.	Apoptosis triggered by viral infection primarily benefits:		
	(A)	Producing soluble receptors for interferons		(A)	The virus, by enhancing spread	
	(B)	Inhibiting MHC I expression		(B)	The host, by limiting viral replication	
	(C)	Suppressing antibody production		(C)	Both virus and host equally	
	(D)	Triggering apoptosis		(D)	Neither, it is accidental	
20.	Inclusion bodies in viral infections represent:		24.	The pathogenic property of Candida albicans		
	(A)	Aggregates of viral proteins/nucleic		is large	ely due to:	
		acids		(A)	Exotoxin production	
	(B)	Dead host cells		(B)	Endotoxin release	
	(C)	Phagocytosed bacteria		(C)	Hyphal formation and adhesins	
	(D)	Endotoxin accumulation		(D)	Spore motility	
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25.	Fungal toxins such as aflatoxin are produced by:			Helminths are most commonly shed from the host via:			
	(A)	Aspergillus species		(A)	Respiratory tract		
	(B)	Candida species		(B)	Skin lesions		
	(C)	Cryptococcus species		(C)	Urinary tract		
	(D)	Histoplasma species		(D)	Gastrointestinal tract		
26.	Helminths evade host defenses mainly by:		30.		HIV is most often transmitted through which portal of exit?		
	(A)	Rapid replication		(A)	Blood and sexual secretions		
	(B)	Destroying host DNA		(B)	Saliva		
	(C)	Producing exotoxins		(C)	Feces		
	(D)	Suppressing immune responses and antigenic masking	31.	(D)	Respiratory droplets		
				Which of the following best describes plant			
27.	The	most common portal of exit for		defen	se genetics?		
	respir	respiratory pathogens is:		(A)	Interaction of plant hormones only		
	(A)	Urine		(B)	Interaction between host resistance		
	(B)	Blood			genes and pathogen genes		
	(C)	Coughing and sneezing		(C)	Mutation of chloroplast DNA		
	(D)	Skin flakes		(D)	RNA splicing in plants		
28.	Which	of the following is a portal of exit for bacterium tuberculosis?	32.	Which defen	n molecules often mediate basal plant se?		
	(A)	Feces		(A)	Pattern recognition receptors (PRRs)		
	(B)	Saliva and sputum		(B)	AVR proteins		
	(C)	Urine		(C)	Small interfering RNAs		
	(D)	Blood		(D)	Photosynthetic enzymes		

- 33. Which concept explains why a resistant plant variety recognizes and stops a pathogen?
  - (A) Mutation theory
  - (B) Central dogma
  - (C) Law of segregation
  - (D) Gene-for-gene hypothesis
- 34. In the gene-for-gene relationship, resistance occurs when:
  - (A) Both R gene and AVR gene are absent
  - (B) R gene is absent and AVR gene is present
  - (C) R gene is present and AVR gene is present
  - (D) Both R and AVR genes are nonfunctional
- 35. A non-adapted pathogen is defined as:
  - (A) Pathogen infecting only one specific cultivar
  - (B) Pathogen that cannot infect a plant species at all
  - (C) Pathogen producing toxins in a host
  - (D) Pathogen overcoming vertical resistance
- 36. Non-host resistance is considered:
  - (A) Species-level immunity
  - (B) Cultivar-specific immunity

- (C) Controlled by a single R-gene
- (D) Induced by pathogen toxins only
- 37. Which of the following is a feature of horizontal resistance?
  - (A) Race-specificity
  - (B) Short-lived
  - (C) Partial resistance to many races
  - (D) Based only on hypersensitive response
- 38. The genetic basis of horizontal resistance is often:
  - (A) Monogenic
  - (B) Oligogenic
  - (C) Polygenic
  - (D) Cytoplasmic
- 39. Which of the following belongs to the R-gene class?
  - (A) NBS-LRR genes
  - (B) Rubisco genes
  - (C) PRR genes only
  - (D) Photosystem II genes
- 40. The main drawback of vertical resistance is:
  - (A) Pathogen adapts quickly
  - (B) Requires multiple genes
  - (C) Not heritable
  - (D) Cannot be used in breeding

41. Which defense is rapidly induced after 45. If an avr gene is mutated and not recognized R-avr recognition? by the plant, the pathogen: (A) Becomes avirulent (A) Non-host resistance (B) Becomes virulent (B) Horizontal resistance (C) Stops infection Photosynthesis inhibition (C) (D) Dies immediately (D) Hypersensitive response 46. avr - R gene interaction leads to: 42. Which of the following mechanisms (A) Disease establishment contributes to non-host resistance? (B) Chlorosis (A) Cell wall reinforcement (C) Non-host resistance (D) Resistance through HR (B) Antimicrobial compound production Gene-for-gene hypothesis was proposed 47. (C) Programmed cell death by: All of the above (D) (A) Mendel 43. Preformed barriers in non-host resistance (B) Flor include: (C) Darwin (A) Cuticle and cell wall (D) Hooke 48. The gene-for-gene relationship highlights: (B) PR proteins Pathogen-pathogen interaction (A) (C) Hypersensitive response Role of environmental stress (B) (D) avr gene silencing Role of polygenic inheritance (C) 44. avr genes encode: (D) Specificity in host-pathogen (A) Enzymes for photosynthesis interactions 49. Gene-for-gene interaction results in: (B) Pathogen effectors recognized by Vertical resistance (A) R proteins (B) Horizontal resistance (C) Plant defense hormones Non-host resistance (C) (D) Secondary metabolites

(D)

No resistance

- 50. Hypersensitive response (HR) in plants is characterized by: (A) Viral replication enhancement (B) Rapid pathogen growth

  - (C) Increased chlorophyll production
  - (D) Localized cell death
- 51. The HR helps the plant by:
  - (A) Limiting pathogen spread
  - (B) Increasing photosynthesis
  - (C) Enhancing seed germination
  - (D) Providing nutrients to pathogen
- 52. HR is a hallmark of:
  - (A) Vertical resistance
  - (B) Horizontal resistance
  - (C) Non-host resistance
  - (D) Symbiotic interaction
- 53. Which of the following is a pre-existing structural defense in plants?
  - (A) Callose deposition
  - (B) Cuticle and wax layers
  - (C) Hypersensitive response
  - (D) Phytoalexin production
- 54. Which of these is a pre-existing chemical defense in plants?
  - (A) Phytoalexins
  - (B) Salicylic acid burst

- (C) Pathogenesis-related proteins
- (D) Alkaloids and saponins
- 55. Systemic acquired resistance (SAR) is typically associated with which signaling molecule?
  - (A) Ethylene
  - (B) Jasmonic acid
  - (C) Salicylic acid
  - (D) Abscisic acid
- 56. Induced systemic resistance (ISR) is generally triggered by:
  - Viral infection (A)
  - Overproduction of lignin (B)
  - (C) Herbivore attack only
  - (D) Beneficial rhizobacteria
- 57. Which plant hormone is most strongly linked with ISR?
  - (A) Salicylic acid
  - (B) Auxin
  - Jasmonic acid and ethylene (C)
  - Gibberellins (D)
- Which of the following is not considered a 58. pre-existing structural defense?
  - (A) Trichomes
  - (B) Guard cells
  - (C) Suberin in bark
  - (D) Hypersensitive cell death

- 59. Defense priming in plants refers to:
  - (A) Permanent activation of defense genes
  - (B) The plant's ability to respond faster and stronger upon re-exposure
  - (C) Immediate hypersensitive response to pathogens
  - (D) Increased nutrient uptake before infection
- 60. Pathogenesis-related (PR) proteins such as chitinases and ß-1,3-glucanases are commonly expressed during:
  - (A) SAR only
  - (B) ISR only
  - (C) Both SAR and ISR
  - (D) Pre-existing defense
- 61. ISR is often considered different from SAR because:
  - (A) ISR is dependent on salicylic acid
  - (B) ISR requires beneficial microbes rather than pathogen infection
  - (C) ISR involves direct antimicrobial compound synthesis
  - (D) ISR kills infected cells directly
- 62. Which of the following is a chemical defense induced upon infection?
  - (A) Phytoalexins
  - (B) Waxy cuticle
  - (C) Trichomes
  - (D) Thickened epidermis

- 63. Which microorganism group most commonly triggers ISR in plants?
  - (A) Pathogenic fungi
  - (B) Symbiotic nitrogen-fixing bacteria
  - (C) Plant growth-promoting rhizobacteria (PGPR)
  - (D) Viruses
- 64. The deposition of callose in sieve plates during pathogen invasion is an example of:
  - (A) Pre-existing defense
  - (B) Induced structural defense
  - (C) Induced chemical defense
  - (D) Defense priming
- 65. Which of the following is an example of bacterial adhesin involved in plant pathogenesis?
  - (A) Type IV pili
  - (B) Flagellin
  - (C) Pectin methylesterase
  - (D) Lipopolysaccharide
- 66. Surface polysaccharides in plant pathogenic bacteria primarily contribute to:
  - (A) Photosynthesis
  - (B) Host recognition and biofilm formation
  - (C) DNA replication
  - (D) Protein synthesis

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67.	Which secretion system is most commonly associated with direct delivery of effector proteins into plant cells?			71.	The hypersensitive response in plants is often triggered by:		
					(A)	Bacterial exopolysaccharides	
	(A)	Type III Type V			(B)	Excessive lignin deposition	
	(B)				(C)	Phytotoxin accumulation	
	(C)					•	
	(D)	Type VI			(D)	Recognition of bacterial effectors	
68.	Cell wall degrading enzymes (CWDEs) secreted by pathogens mainly target:			72.		secretion system mainly exports:	
	(A)	) Lignin only			(A)	Flagellar proteins	
	(B)				(B)	Cell wall degrading enzymes	
	(C)	Pectin, cellulose, and	d		(C)	Transcription factors	
		hemicellulose			(D)	RNA polymerases)	
	(D)	Protein kinases		73.	Which regulatory protein in Agrobacterium		
69.	Which bacterial toxin is produced by Pseudomonas syringae?				tumefaciens controls vir gene expression?		
	(A)	Coronatine			(A)	NifA	
	(B)	Tabtoxin			(B)	VirA/VirG two-component system	
	(C)	Aflatoxin			(C)	LuxR	
	(D)	Ochratoxin			(D)	PhoP	
70.	The role of quorum-sensing in plant pathogenic bacteria is to:			74.	Which secretion system is involved in DNA and protein transfer in Agrobacterium		
	(A)	Coordinate virulence gene expression at high population density  Prevent plasmid transfer			tumefaciens?		
	(B)				(A)	Type I	
					(B)	Type II	
	(C)				(C)	Type IV	
	(D)				(D)	Type VI	
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75. The function of bacterial effector proteins (B) Nutrient uptake from host cells delivered by T3SS is to: (C) Defense against host (A) Suppress host defense and (D) Spore dispersal manipulate host metabolism 80. The characteristic symptom of viral mosaic (B) Enhance host immunity diseases in plants is: (C) Stimulate plant photosynthesis (A) Yellow and green mottling on leaves (D) Aid bacterial sporulation (B) Black necrotic lesions 76. Which bacterial virulence function is (C) Leaf wilting due to xylem blockage responsible for gall formation in plants? **EPS** (A) (D) Gall formation on stems (B) Ti plasmid T-DNA 81. Which plant virus has a DNA genome? (C) Coronatine (A) Cauliflower mosaic virus (CaMV) (D) Xanthomonadin Potato virus X (B) 77. Which of the following is a common fungal TMV (C) pathogenicity factor in plants? Rice tungro virus (D) (A) Effector proteins 82. Biotic stress includes: (B) Photosynthetic pigments (A) Drought and cold (C) Nitrogenase enzyme (B) Flood and salinity (D) Leghemoglobin 78. Insect herbivory and pathogens Appressorium in fungal pathogens helps in: (C) Nutrient storage (A) Nutrient deficiency (D) (B) Light absorption 83. The zig-zag model of plant immunity was Host penetration proposed by: (C) (D) DNA replication D.J. Klessig (A) 79. Haustoria are specialized fungal structures (B) J.D.G. Jones and J.L. Dangl used for: (C) F.A. Smith (A) Reproduction (D) B. Baker L040907T/60 (12)

84. In the zig-zag model, the first layer of plant 88. An example of a PAMP is: defense is: (A) Flagellin (flg22 peptide) (A) Effector-triggered immunity (ETI) (B) Avr gene product (B) RNA interference Salicylic acid (C) Hypersensitive response (HR) (C) (D) Lignin (D) PAMP-triggered immunity (PTI) 89. Recognition of effectors by resistance (R) 85. ETI (Effector-Triggered Immunity) is mainly proteins leads to mediated by: (A) PTI (A) Receptor-like kinases ABA production (B) (B) NB-LRR resistance proteins (C) PAMP perception (C) Callose deposition (D) ETI (D) Lignin synthesis 90. Transgenic plants expressing chitinase are 86. Jasmonic acid (JA) and ethylene (ET) are resistant to: generally involved in defense against: Fungal pathogens (A) (A) Necrotrophic pathogens and herbivores Bacterial pathogens (B) (B) Biotrophic pathogens (C) Viral pathogens (C) Viruses (D) Nematodes (D) Mycorrhizal fungi 91. Systemic acquired resistance (SAR) is 87. PAMP-triggered immunity is triggered by usually associated with accumulation of: recognition of: (A) **Phytoalexins** (A) **Effectors** Pathogenesis-related (PR) proteins (B) PAMPs/MAMPs (B) (C) Chitinase inhibitors (C) Secondary metabolites (D) Lipid transfer proteins (D) **Phytoalexins** 

92.		I, recognition often involves which		(B)	Antisense RNA and RNAi		
		ural domains of R proteins?		(C)	Overexpression of phytoalexins		
	(A)	Zinc fingers		(D)	Bt gene		
		<ul><li>(B) Helix-turn-helix</li><li>(C) Leucine-rich repeats (LRRs)</li></ul>		Yello	Yellowing of leaves due to loss of		
	(C)			chlore	chlorophyll is called:		
	(D)	WD40 repeats		(A)	Necrosis		
93.		se deposition in plant defense		(B)	Chlorosis		
	strengthens:			(C)	Mottling		
	(A)	<ul><li>(A) Cell wall</li><li>(B) Nucleus</li><li>(C) Chloroplast membrane</li></ul>		(D)	Blight		
	(B)			Locali	_ocalized death of plant tissue resulting in		
	(C)			brown	brown or black spots is known as:		
	(D)	Ribosome structure		(A)	Gall		
94.		silencing-based resistance in plants is		(B)	Hypertrophy		
		effective mainly against:		(C)	Mosaic		
	(A)	Viruses		(D)	Necrosis		
	(B)	Fungi	99.	` ,	h of the following is a secondary		
	(C)	Bacteria		metabolite used in plant defense?			
	(D)	Nematodes		(A)	Sucrose		
95.		n defense response is common to both		(B)	Glucose		
	PTI and ETI?			(C)	Flavonoids		
	(A)	HR cell death					
	(B)	Oxidative burst (ROS production)		(D)	ATP		
	(C)	RNA interference	100.		Pathogen recognition by plants ofter involves:		
	(D)	Transposon activation					
96.	Which	n biotechnological tool has been most		(A)	ATPases		
	succe	successful for developing virus-resistant		(B)	Cytochromes		
	crops	crops?		(C)	Pectinases		
	(A)	CRISPR-Cas9		(D)	Receptor-like kinases (RLKs)		

(14)

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# Rough Work

## Example:

#### Question:

- Q.1 **A © D**
- Q.2 **A B O**
- Q.3 (A) (C) (D)
- Each question carries equal marks.
   Marks will be awarded according to the number of correct answers you have.
- All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
- 7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
- 8. After the completion of the examination, candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
- 9. There will be no negative marking.
- 10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
- 11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.
- 12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

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

### उदाहरण :

#### प्रश्न :

प्रश्न 1 (A) ● (C) (D)

प्रश्न 2 (A) (B) ■ (D)

प्रश्न 3 **A ● C D** 

- प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
- सभी उत्तर केवल ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
- 7. ओ॰एम॰आर॰ उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
- 8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
- 9. निगेटिव मार्किंग नहीं है।
- 10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
- परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
- 12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

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