

INI CET Microbiology

Sample Paper – 6

Duration: 14 Minutes

Maximum Marks: 15

Instructions

- This paper contains **15** Multiple Choice Questions (Single Best Response), modelled on the Microbiology content of **INI CET** (Institutes of National Importance Combined Entrance Test) conducted by AIIMS New Delhi.
- The **15-question** length matches the number of Microbiology items you actually meet in the real 200-question paper.
- Each correct answer carries **+1 mark**. There is **negative marking of one-third (0.33) mark** for every incorrect answer; unattempted questions carry no penalty.
- Every question has **exactly one best answer**. Choose the single most appropriate option.
- Attempt this practice paper in one timed sitting of about **14 minutes**, the pace the real computer-based test demands.

General Microbiology and Sterilization

- Q1.** Which set of criteria establishes that a specific microorganism is the cause of a specific infectious disease, requiring the organism to be found in all diseased hosts, isolated in pure culture, reproduce the disease when inoculated, and be recovered again?
- (A) Koch's postulates
(B) Semmelweis criteria
(C) Jenner's principle
(D) Pasteur's law
- Q2.** Which biological indicator is used to validate that a steam autoclave cycle has achieved true sterilization?



- (A) Spores of *Bacillus atrophaeus*
- (B) Spores of *Clostridium tetani*
- (C) Spores of *Geobacillus (Bacillus) stearothermophilus*
- (D) Vegetative *Escherichia coli* cells

Q3. Four bacterial cell shapes are drawn below. Which labelled form is the comma-shaped (vibrio) bacterium?



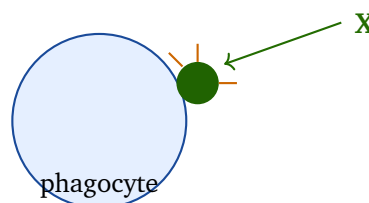
- (A) Shape (A)
- (B) Shape (B)
- (C) Shape (C)
- (D) Shape (D)

Immunology

Q4. Which innate lymphocytes kill virus-infected and tumour cells without prior sensitisation and without MHC restriction, being inhibited by self MHC class I on healthy cells?

- (A) Natural killer (NK) cells
- (B) Cytotoxic CD8 T lymphocytes
- (C) Plasma cells
- (D) Helper CD4 T lymphocytes

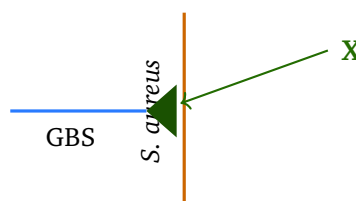
Q5. In the diagram below, a bacterium is coated with antibody and complement C3b, marked X, before a phagocyte engulfs it. This coating process (opsonisation) chiefly serves to:



- (A) Lyse the bacterium directly with the coat
- (B) Enhance phagocytosis by tagging the microbe for engulfment
- (C) Neutralise a bacterial exotoxin
- (D) Trigger histamine release from mast cells

Systematic Bacteriology

- Q6.** A gram-positive rod showing tumbling motility, growing at 4 °C on cold enrichment, is isolated from the cerebrospinal fluid of a neonate with meningitis. The most likely organism is:
- (A) *Corynebacterium diphtheriae*
 - (B) *Bacillus cereus*
 - (C) *Clostridium perfringens*
 - (D) *Listeria monocytogenes*
- Q7.** A patient with lobar pneumonia produces thick, blood-tinged “currant-jelly” sputum, and the culture grows large mucoid capsulated colonies. The causative organism is:
- (A) *Streptococcus pneumoniae*
 - (B) *Haemophilus influenzae*
 - (C) *Pseudomonas aeruginosa*
 - (D) *Klebsiella pneumoniae*
- Q8.** In the plate below, a streak of *Staphylococcus aureus* meets a perpendicular streak of a Group B *Streptococcus*, and an arrowhead-shaped zone of enhanced haemolysis appears at the junction, marked X. This positive result identifies:



- (A) A negative CAMP test
- (B) A positive CAMP test, identifying *Streptococcus agalactiae*
- (C) Optochin sensitivity of *S. pneumoniae*
- (D) Bacitracin sensitivity of *S. pyogenes*

Virology

Q9. Which virus causes chickenpox on primary infection and shingles on re-activation, with multinucleated giant cells seen on a Tzanck smear from the lesion base?

- (A) Measles virus
- (B) Rubella virus
- (C) Varicella-zoster virus
- (D) Parvovirus B19

Q10. Which virus, a flavivirus transmitted by the *Aedes aegypti* mosquito, can progress to dengue haemorrhagic fever with plasma leakage and thrombocytopenia?

- (A) Dengue virus
- (B) Rabies virus
- (C) Rotavirus
- (D) Mumps virus

Mycology and Parasitology

Q11. An AIDS patient with a low CD4 count develops a dry cough and breathlessness; a silver (GMS) stain of bronchoalveolar lavage shows cup-shaped cysts. The causative organism is:

- (A) *Candida albicans*
- (B) *Aspergillus fumigatus*
- (C) *Cryptococcus neoformans*



(D) *Pneumocystis jirovecii*

Q12. Which parasite is the largest intestinal roundworm of humans, whose larvae migrate through the lungs and can cause Loeffler syndrome with pulmonary eosinophilia?

(A) *Ascaris lumbricoides*

(B) *Enterobius vermicularis*

(C) *Trichuris trichiura*

(D) *Taenia saginata*

Q13. A blood fluke whose egg carries a terminal spine is recovered from the urine of a patient with haematuria; chronic infection is linked to bladder cancer. The organism is:

(A) *Fasciola hepatica*

(B) *Schistosoma haematobium*

(C) *Clonorchis sinensis*

(D) *Paragonimus westermani*

Applied and Diagnostic Microbiology

Q14. Which serological test uses the cross-reaction between *Proteus* OX antigens and antibodies produced during rickettsial infection to screen for typhus and spotted fevers?

(A) Widal test

(B) VDRL test

(C) Weil-Felix test

(D) Paul-Bunnell test

Q15. Which microscopy technique is used to visualise the thin, motile spirochaete *Treponema pallidum* directly in the exudate of a primary syphilitic chancre?



- (A) Phase-contrast microscopy
- (B) Fluorescence microscopy
- (C) Dark-field microscopy
- (D) Electron microscopy



Detailed Solutions**Q1.****Solution**

Concept – proving causation: Linking one microbe to one disease needs a defined logical sequence.

Step 1 – name the criteria: Koch's postulates require the organism to be present in all diseased hosts, isolated in pure culture, reproduce the disease on inoculation, and be re-isolated from the new host.

Step 2 – why they matter: They form the classical framework that establishes a causal, not merely associated, relationship.

Why the other options are wrong:

- B, Semmelweis: pioneered hand antisepsis, not a causation framework.
- C, Jenner: developed smallpox vaccination.
- D, "Pasteur's law": not a recognised set of causation criteria.

Final Answer: Koch's postulates $\Rightarrow$ A

Answer: (A) [Go Back to Q1](#)

Q2.**Solution**

Concept – validating an autoclave: Sterilization is confirmed by killing the most heat-resistant spores.

Step 1 – name the indicator: Spores of *Geobacillus (Bacillus) stearothermophilus* are the biological indicator for moist-heat (steam) sterilization.

Step 2 – why this species: Its spores are highly heat-resistant; if they are killed at 121 °C, the cycle has truly sterilized. No growth on subculture confirms success.

Why the other options are wrong:

- A, *Bacillus atrophaeus*: the indicator for dry-heat and ethylene-oxide, not steam.
- B, *Clostridium tetani*: a pathogen, not a validation indicator.
- D, vegetative *E. coli*: killed far too easily to test spore-level sterility.

Final Answer: *Geobacillus stearothermophilus* spores $\Rightarrow$ C

Answer: (C) [Go Back to Q2](#)



Q3.

Solution

Concept – bacterial morphology: Bacteria are grouped by shape into cocci, bacilli, vibrios and spirilla.

Step 1 – read the figure: Shape (A) is a round coccus, (C) is a straight rod (bacillus) and (D) is a wavy spirillum.

Step 2 – identify the vibrio: Shape (B) is the gently curved, comma-shaped cell, which is the **vibrio** form, as in *Vibrio cholerae*.

Why the other options are wrong:

- A, shape (A): a spherical coccus.
- C, shape (C): a straight bacillus.
- D, shape (D): a multi-turn spiral (spirillum).

Final Answer: Shape (B), the comma-shaped vibrio ⇒ B

Answer: (B) [Go Back to Q3](#)

Q4.

Solution

Concept – innate cytotoxic lymphocytes: Some lymphocytes kill without needing antigen presentation.

Step 1 – name the cell: Natural killer (NK) cells destroy virus-infected and tumour cells without prior sensitisation and without MHC restriction.

Step 2 – the control mechanism: Normal self MHC class I inhibits them; cells that lose MHC (“missing self”) are killed.

Why the other options are wrong:

- B, CD8 T cells: adaptive, MHC-I restricted, need prior sensitisation.
- C, plasma cells: secrete antibody, do not kill directly.
- D, CD4 T cells: helper cells, MHC-II restricted.

Final Answer: Natural killer (NK) cells ⇒ A

Answer: (A) [Go Back to Q4](#)



Q5.

Solution

Concept – opsonisation: Coating a microbe makes it easier for phagocytes to grip.

Step 1 – read the figure: X marks the antibody and complement C3b coat on the bacterial surface.

Step 2 – name the effect: This coating **enhances phagocytosis by tagging the microbe for engulfment**; phagocyte Fc and C3b receptors bind the opsonins and pull the organism in.

Why the other options are wrong:

- A, direct lysis: done by the membrane attack complex, not by opsonin coating.
- C, toxin neutralisation: a separate antibody function, not opsonisation.
- D, histamine release: driven by IgE on mast cells in allergy.

Final Answer: Enhance phagocytosis by tagging the microbe ⇒ **B**

Answer: (B) [Go Back to Q5](#)

Q6.

Solution

Concept – cold-growing gram-positive rod: A few organisms multiply at refrigerator temperature.

Step 1 – apply the clues: A gram-positive rod with tumbling motility, cold enrichment growth at 4 °C and neonatal meningitis is *Listeria monocytogenes*.

Step 2 – the disease: It is acquired from contaminated dairy or deli foods and crosses the placenta, causing neonatal sepsis and meningitis.

Why the other options are wrong:

- A, *C. diphtheriae*: non-motile, causes diphtheria, not cold-tolerant meningitis.
- B, *Bacillus cereus*: spore-forming food poisoning, not tumbling-motile neonatal meningitis.
- C, *Clostridium perfringens*: anaerobe of gas gangrene.

Final Answer: *Listeria monocytogenes* ⇒ **D**



Answer: (D) [Go Back to Q6](#)

Q7.

Solution

Concept – capsulated lobar pneumonia: A heavily capsulated gram-negative rod gives a distinctive sputum.

Step 1 – match the clues: Currant-jelly sputum with large mucoid capsulated colonies and lobar pneumonia points to *Klebsiella pneumoniae*.

Step 2 – who is affected: It classically strikes alcoholics and debilitated patients, often causing lung abscess.

Why the other options are wrong:

- A, *S. pneumoniae*: gram-positive diplococci with rusty sputum, not mucoid gram-negative colonies.
- B, *H. influenzae*: small gram-negative coccobacilli needing X and V factors.
- C, *Pseudomonas*: greenish pigment, not currant-jelly sputum.

Final Answer: *Klebsiella pneumoniae* ⇒ D

Answer: (D) [Go Back to Q7](#)

Q8.

Solution

Concept – the CAMP test: Some streptococci enhance staphylococcal haemolysis.

Step 1 – read the plate: X marks the arrowhead of enhanced haemolysis where the streptococcal streak meets the *S. aureus* beta-lysin.

Step 2 – interpret it: This **positive CAMP test identifies *Streptococcus agalactiae*** (Group B *Streptococcus*); its CAMP factor synergises with staphylococcal beta-toxin.

Why the other options are wrong:

- A, negative CAMP: no arrowhead would form.
- C, optochin: a disk test for *S. pneumoniae*, unrelated to this arrowhead.
- D, bacitracin: identifies *S. pyogenes* (Group A), a different test.

Final Answer: Positive CAMP test, *S. agalactiae* ⇒ B

Answer: (B) [Go Back to Q8](#)



Q9.

Solution

Concept – a virus with two clinical faces: One herpesvirus causes distinct primary and reactivation diseases.

Step 1 – name the virus: **Varicella-zoster virus** causes chickenpox on primary infection and shingles (herpes zoster) on reactivation from dorsal root ganglia.

Step 2 – the diagnostic clue: A Tzanck smear shows multinucleated giant cells, shared with herpes simplex.

Why the other options are wrong:

- A, measles: causes rash with Koplik spots, no zoster.
- B, rubella: mild rash and congenital defects, no shingles.
- D, parvovirus B19: causes erythema infectiosum (slapped cheek).

Final Answer: Varicella-zoster virus $\Rightarrow$

Answer: (C) [Go Back to Q9](#)

Q10.

Solution

Concept – mosquito-borne flavivirus: An *Aedes*-transmitted virus can turn haemorrhagic.

Step 1 – name the virus: **Dengue virus**, a flavivirus spread by *Aedes aegypti*, causes dengue fever and dengue haemorrhagic fever.

Step 2 – the severe form: A second infection with a different serotype can cause plasma leakage, thrombocytopenia and shock (antibody-dependent enhancement).

Why the other options are wrong:

- B, rabies: bite-transmitted rhabdovirus, encephalitis.
- C, rotavirus: faecal-oral, infantile diarrhoea.
- D, mumps: respiratory paramyxovirus, parotitis.

Final Answer: Dengue virus $\Rightarrow$

Answer: (A) [Go Back to Q10](#)



Q11.

Solution

Concept – opportunistic AIDS pneumonia: A silver-staining cyst gives away the organism.

Step 1 – match the picture: Cup-shaped cysts on a silver (GMS) stain of lavage in an AIDS patient point to *Pneumocystis jirovecii* pneumonia (PCP).

Step 2 – the setting: It appears when the CD4 count falls below about 200; treatment is co-trimoxazole.

Why the other options are wrong:

- A, *Candida*: pseudohyphae and budding yeast, not GMS cysts in lung.
- B, *Aspergillus*: septate hyphae with acute-angle branching.
- C, *Cryptococcus*: capsulated yeast causing meningitis, seen with India ink.

Final Answer: *Pneumocystis jirovecii* ⇒ D

Answer: (D) [Go Back to Q11](#)

Q12.

Solution

Concept – the largest intestinal roundworm: One nematode migrates through the lungs before maturing in the gut.

Step 1 – name it: *Ascaris lumbricoides* is the largest intestinal roundworm of humans.

Step 2 – the lung phase: Larvae migrate through the alveoli, and this passage can cause Loeffler syndrome with pulmonary eosinophilia.

Why the other options are wrong:

- B, *Enterobius*: pinworm, causes perianal itching, no lung migration of note.
- C, *Trichuris*: whipworm, causes rectal prolapse, confined to the colon.
- D, *Taenia saginata*: a tapeworm, not a roundworm.

Final Answer: *Ascaris lumbricoides* ⇒ A

Answer: (A) [Go Back to Q12](#)



Q13.

Solution

Concept – terminal-spine blood fluke: Egg shape and location separate the schistosomes.

Step 1 – name it: An egg with a **terminal spine** recovered from urine, with haematuria, is *Schistosoma haematobium*.

Step 2 – the complication: Chronic bladder infection causes fibrosis and is linked to squamous cell carcinoma of the bladder.

Why the other options are wrong:

- A, *Fasciola hepatica*: a liver fluke, not a blood fluke.
- C, *Clonorchis sinensis*: Chinese liver fluke, bile ducts.
- D, *Paragonimus*: lung fluke with operculated eggs in sputum.

Final Answer: *Schistosoma haematobium* ⇒ **B**

Answer: (B) [Go Back to Q13](#)

Q14.

Solution

Concept – cross-reacting rickettsial serology: An old agglutination test uses *Proteus* antigens as a stand-in.

Step 1 – name the test: The **Weil-Felix test** detects anti-rickettsial antibodies through their cross-reaction with the OX antigens of certain *Proteus* strains.

Step 2 – its use: The pattern of OX-19, OX-2 and OX-K agglutination screens for typhus and spotted fevers.

Why the other options are wrong:

- A, Widal: agglutination screen for enteric fever (*Salmonella*).
- B, VDRL: a flocculation test for syphilis.
- D, Paul-Bunnell: heterophile antibodies of infectious mononucleosis.

Final Answer: Weil-Felix test ⇒ **C**

Answer: (C) [Go Back to Q14](#)



Q15.

Solution

Concept – seeing an unstainable spirochaete: *Treponema pallidum* is too thin for routine light stains.

Step 1 – name the method: **Dark-field microscopy** is used to see the thin, motile spirochaete directly in the serous exudate of a primary chancre.

Step 2 – why it works: Against a black background the organism scatters light and appears bright, revealing its corkscrew motility.

Why the other options are wrong:

- A, phase-contrast: shows unstained cells but is not the standard for chancre treponemes.
- B, fluorescence: needs a labelled antibody (DFA-TP), a different technique.
- D, electron microscopy: not a routine bedside diagnostic tool.

Final Answer: Dark-field microscopy ⇒

Answer: (C) [Go Back to Q15](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	C	3	B	4	A	5	B
6	D	7	D	8	B	9	C	10	A
11	D	12	A	13	B	14	C	15	C

