

INI CET Microbiology

Sample Paper – 3

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.

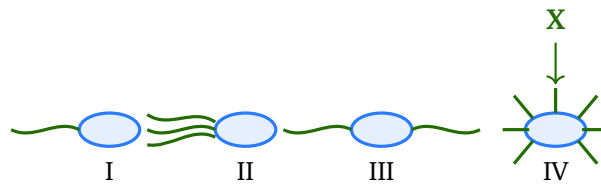
General Microbiology and Sterilization

- Q1.** A negative staining method using nigrosin or eosin, in which the background is coloured but the structure itself stays unstained and appears as a clear halo, is used to demonstrate the bacterial:
- (A) Capsule
 - (B) Flagellum
 - (C) Endospore
 - (D) Cell wall
- Q2.** Which method is the sterilization technique of choice for heat-labile fluids such as serum and antibiotic solutions, because it removes microbes without heat?



- (A) Autoclaving at 121 °C
- (B) Hot-air oven at 160 °C
- (C) Membrane filtration through a 0.22 μm filter
- (D) Boiling at 100 °C for 30 minutes

Q3. The four bacteria below differ in flagellar arrangement. The organism marked X, which carries flagella distributed all over its surface (the peritrichous pattern), is:



- (A) Cell I (monotrichous)
- (B) Cell II (lophotrichous)
- (C) Cell III (amphitrichous)
- (D) Cell IV (peritrichous)

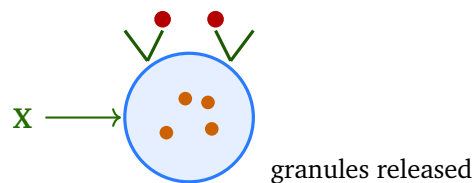
Immunology

Q4. Which immunoglobulin is the main antibody of mucosal and secretory immunity, existing as a dimer joined by a J chain and carrying a secretory piece?

- (A) IgM
- (B) IgG
- (C) IgE
- (D) Secretory IgA

Q5. In the schematic below, allergen molecules bridge two IgE antibodies bound to a mast cell (marked X), triggering the release of histamine. This immediate reaction is:



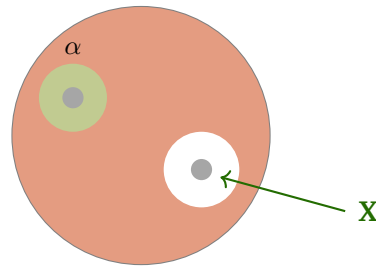


- (A) Type III (immune complex) hypersensitivity
- (B) Type II (cytotoxic) hypersensitivity
- (C) Type I (immediate, IgE and mast-cell mediated) hypersensitivity
- (D) Type IV (delayed, T-cell mediated) hypersensitivity

Systematic Bacteriology

- Q6.** An obligate anaerobe forms a terminal round spore that bulges the rod into a characteristic “drumstick” shape and produces the neurotoxin tetanospasmin. This organism is:
- (A) *Clostridium tetani*
 - (B) *Clostridium perfringens*
 - (C) *Bacillus cereus*
 - (D) *Listeria monocytogenes*
- Q7.** A large gram-positive rod with square (“box-car”) ends and central spores grows as “medusa head” colonies on nutrient agar and causes anthrax. It is:
- (A) *Bacillus anthracis*
 - (B) *Corynebacterium diphtheriae*
 - (C) *Clostridium botulinum*
 - (D) *Nocardia asteroides*
- Q8.** On the blood-agar plate below, colony X is surrounded by a completely clear, transparent zone where the red cells have been fully lysed. This pattern of haemolysis is termed:





- (A) Alpha (partial, green) haemolysis
- (B) Beta (complete) haemolysis
- (C) Gamma (no) haemolysis
- (D) Double-zone haemolysis

Virology

Q9. Influenza virus periodically causes worldwide pandemics through a sudden major change in its surface antigens, produced by the reassortment of its segmented RNA genome. This mechanism is called:

- (A) Antigenic drift by point mutation
- (B) Phenotypic mixing
- (C) Complementation
- (D) Antigenic shift by genetic reassortment

Q10. Small bluish-white spots with a red base on the buccal mucosa opposite the molars, appearing before the rash, are pathognomonic (Koplik spots) of infection by:

- (A) Rubella virus
- (B) Measles (rubeola) virus
- (C) Varicella-zoster virus
- (D) Mumps virus

Mycology and Parasitology

Q11. A group of keratinophilic fungi comprising *Trichophyton*, *Microsporum* and *Epidermophyton* causes ringworm (tinea), and a KOH mount of skin scrapings shows septate hyphae. These fungi are the:



- (A) Dimorphic systemic fungi
- (B) Dermatophytes
- (C) Yeasts of the genus *Candida*
- (D) Zygomycetes (moulds causing mucormycosis)

Q12. Visceral leishmaniasis (kala-azar) is transmitted by the sandfly, and a bone-marrow smear shows amastigotes (LD bodies) inside macrophages. The causative parasite is:

- (A) *Trypanosoma cruzi*
- (B) *Toxoplasma gondii*
- (C) *Leishmania donovani*
- (D) *Plasmodium falciparum*

Q13. Ingesting the eggs of the pork tapeworm leads to larval cysts in tissues, including the brain (neurocysticercosis). The tapeworm responsible is:

- (A) *Taenia saginata*
- (B) *Echinococcus granulosus*
- (C) *Taenia solium*
- (D) *Diphyllobothrium latum*

Applied and Diagnostic Microbiology

Q14. Which non-treponemal flocculation test, using a cardiolipin-lecithin-cholesterol antigen, is widely used to screen for syphilis?

- (A) FTA-ABS test
- (B) VDRL / RPR test
- (C) Weil-Felix test
- (D) Coombs test

Q15. Adding hydrogen peroxide to a colony produces brisk bubbling with *Staphylococcus* but no bubbles with *Streptococcus*. The test that exploits this difference is the:



- (A) Catalase test
- (B) Coagulase test
- (C) Oxidase test
- (D) Urease test



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

Concept – negative staining: Some structures resist ordinary dyes, so we stain the background instead and let the structure show up as a clear gap.

Step 1 – name the method: Nigrosin or eosin colours the field dark; the acidic dye is repelled by the cell, leaving an unstained zone.

Step 2 – read the result: A clear halo around the cell against a dark background is the **capsule**, a gel layer that does not take up simple stains.

Why the other options are wrong:

- B, flagellum: needs special mordant flagellar stains to be seen at all.
- C, endospore: shown by the Schaeffer-Fulton (malachite green) method.
- D, cell wall: outlined by the Gram stain, not by a negative halo.

Final Answer: Capsule $\Rightarrow$

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

Q2.**Solution**

Concept – sterilising heat-labile liquids: Serum, some antibiotics and vitamins are destroyed by heat, so a cold method is needed.

Step 1 – pick the method: **Membrane filtration** through a $0.22\ \mu\text{m}$ pore membrane physically traps bacteria while the fluid passes through.

Step 2 – why it works: The pore size is smaller than bacteria, so the filtrate is bacteria-free without any temperature rise.

Why the other options are wrong:

- A, autoclaving: $121\ ^\circ\text{C}$ would denature serum proteins.
- B, hot-air oven: $160\ ^\circ\text{C}$ dry heat is only for glassware and powders.
- D, boiling: still hot and does not reliably kill spores anyway.

Final Answer: Membrane filtration ($0.22\ \mu\text{m}$) $\Rightarrow$

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



Q3.

Solution

Concept – flagellar arrangements: Bacteria are classified by the number and position of their flagella.

Step 1 – read the figure: X points to cell IV, which has flagella arising from all over its surface.

Step 2 – name the pattern: Flagella distributed uniformly around the whole cell define the **peritrichous** arrangement, seen in *Escherichia coli* and *Salmonella*.

Why the other options are wrong:

- A, cell I: a single polar flagellum is monotrichous.
- B, cell II: a tuft of flagella at one pole is lophotrichous.
- C, cell III: one flagellum at each pole is amphitrichous.

Final Answer: Cell IV, peritrichous ⇒

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

Q4.

Solution

Concept – secretory immunity: Mucosal surfaces need an antibody that survives in secretions.

Step 1 – name the class: **Secretory IgA** is the main antibody of saliva, tears, milk and gut and respiratory secretions.

Step 2 – its structure: At mucosa it exists as a dimer held by a J chain and wrapped in a secretory piece that protects it from enzymes.

Why the other options are wrong:

- A, IgM: the first serum antibody, a pentamer, not the secretory type.
- B, IgG: the main serum and memory antibody, crosses the placenta.
- C, IgE: mediates allergy and antiparasite defence.

Final Answer: Secretory IgA ⇒

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



Q5.

Solution

Concept – hypersensitivity types: The four Gell and Coombs types differ in the immune element involved.

Step 1 – read the figure: X marks a mast cell coated with IgE; allergen bridges two IgE molecules and cross-links them.

Step 2 – name the reaction: Cross-linking triggers degranulation and histamine release: this is **Type I (immediate) hypersensitivity**, the basis of allergy and anaphylaxis.

Why the other options are wrong:

- A, Type III: soluble antigen-antibody complexes deposit in tissues.
- B, Type II: antibody binds antigen on a cell surface, causing lysis.
- D, Type IV: sensitised T cells, not IgE or mast cells, act over 48 to 72 hours.

Final Answer: Type I, IgE and mast-cell mediated ⇒

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

Q6.

Solution

Concept – spore-forming anaerobes: The genus *Clostridium* makes spores whose position helps identify the species.

Step 1 – match the clue: A terminal round spore that swells the rod into a **drum-stick** is classic for *Clostridium tetani*.

Step 2 – the disease: This obligate anaerobe releases tetanospasmin, blocking inhibitory neurons and causing spastic paralysis (tetanus).

Why the other options are wrong:

- B, *C. perfringens*: gas gangrene; spores are rare and subterminal.
- C, *Bacillus cereus*: an aerobe causing food poisoning.
- D, *Listeria*: a non-spore-forming rod with tumbling motility.

Final Answer: *Clostridium tetani* ⇒

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



Q7.

Solution

Concept – anthrax bacillus: One aerobic spore-former is a large box-car-shaped rod.

Step 1 – match the description: Square-ended gram-positive rods in chains with central spores, forming “medusa head” colonies, are *Bacillus anthracis*.

Step 2 – the disease: It causes anthrax, with cutaneous, pulmonary (wool sorter's) and intestinal forms, and a prominent capsule in tissue.

Why the other options are wrong:

- B, *Corynebacterium diphtheriae*: club-shaped, non-spore-forming, Albert stain positive.
- C, *Clostridium botulinum*: an anaerobe, not medusa-head colonies.
- D, *Nocardia*: a branching, partially acid-fast filament.

Final Answer: *Bacillus anthracis* ⇒ A

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

Q8.

Solution

Concept – haemolysis on blood agar: The way colonies break down red cells helps group streptococci.

Step 1 – read the plate: X points to a colony ringed by a fully transparent, colourless zone where all red cells are lysed.

Step 2 – name the pattern: Complete clearing is **beta-haemolysis**, seen with *Streptococcus pyogenes* and *Staphylococcus aureus*.

Why the other options are wrong:

- A, alpha: partial lysis giving a greenish halo (e.g. *S. pneumoniae*).
- C, gamma: no haemolysis, the agar stays unchanged.
- D, double-zone: a special narrow-plus-wide pattern of *C. perfringens*, not simple clearing.

Final Answer: Beta (complete) haemolysis ⇒ B

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



Q9.

Solution

Concept – influenza antigenic variation: The virus changes its surface haemagglutinin and neuraminidase in two ways.

Step 1 – name the mechanism: A sudden major change from reassortment of the segmented RNA genome between strains is **antigenic shift**.

Step 2 – the consequence: Because the population has no immunity to the new combination, shift can spark a pandemic.

Why the other options are wrong:

- A, antigenic drift: gradual point mutations causing seasonal epidemics, not pandemics.
- B, phenotypic mixing: a temporary coat swap without genome change.
- C, complementation: helper function between viruses, unrelated to antigen change.

Final Answer: Antigenic shift by reassortment ⇒ D

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

Q10.

Solution

Concept – pathognomonic signs: Some infections have a sign that alone clinches the diagnosis.

Step 1 – identify the sign: Bluish-white spots on a red base on the buccal mucosa, appearing before the rash, are **Koplik spots**.

Step 2 – the virus: They are pathognomonic of **measles (rubeola)**, a paramyxovirus spread by respiratory droplets.

Why the other options are wrong:

- A, rubella: causes a milder rash with posterior cervical lymphadenopathy, no Koplik spots.
- C, varicella-zoster: gives a vesicular “dewdrop” rash, not mucosal spots.
- D, mumps: causes parotitis, not a Koplik-spot enanthem.

Final Answer: Measles virus ⇒ B

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



Q11.

Solution

Concept – superficial fungal infection: Some fungi live only in keratin and cause ringworm.

Step 1 – name the group: *Trichophyton*, *Microsporum* and *Epidermophyton* are the **dermatophytes**, keratinophilic moulds.

Step 2 – the picture: They cause tinea (ringworm) of skin, hair and nails; a KOH mount of scrapings shows branching septate hyphae.

Why the other options are wrong:

- A, dimorphic systemic fungi: e.g. *Histoplasma*, cause deep, not superficial, disease.
- C, *Candida*: a yeast with pseudohyphae, not a dermatophyte.
- D, zygomycetes: broad aseptate hyphae causing invasive mucormycosis.

Final Answer: Dermatophytes ⇒ B

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

Q12.

Solution

Concept – visceral leishmaniasis: An intracellular protozoan spread by the sand-fly attacks the reticuloendothelial system.

Step 1 – name the parasite: Kala-azar with amastigotes (LD bodies) inside macrophages is caused by *Leishmania donovani*.

Step 2 – the clues: The female sandfly (*Phlebotomus*) is the vector, and patients show fever, massive splenomegaly and pancytopenia.

Why the other options are wrong:

- A, *Trypanosoma cruzi*: Chagas disease, spread by the reduviid bug.
- B, *Toxoplasma gondii*: acquired from cats and undercooked meat, causes toxoplasmosis.
- D, *Plasmodium falciparum*: malaria, spread by *Anopheles*, not a sandfly.

Final Answer: *Leishmania donovani* ⇒ C

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



Q13.

Solution

Concept – tapeworm cysticercosis: One tapeworm's eggs, if swallowed, form tissue cysts in humans.

Step 1 – name the worm: The pork tapeworm *Taenia solium* causes cysticercosis when its eggs are ingested.

Step 2 – the danger: Larval cysts lodge in muscle and brain, and neurocysticercosis is a leading cause of acquired epilepsy.

Why the other options are wrong:

- A, *Taenia saginata*: the beef tapeworm; its eggs do not cause human cysticercosis.
- B, *Echinococcus granulosus*: causes hydatid cysts, a different larval disease.
- D, *Diphyllobothrium latum*: the fish tapeworm causing B12 deficiency, not cysticercosis.

Final Answer: *Taenia solium* ⇒

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

Q14.

Solution

Concept – serology of syphilis: Tests are split into non-treponemal screens and treponemal confirmations.

Step 1 – name the test: The VDRL / RPR is a non-treponemal flocculation test using a cardiolipin-lecithin-cholesterol antigen.

Step 2 – its role: It screens for syphilis and monitors treatment because titres fall with cure; reactive results are confirmed by a treponemal test.

Why the other options are wrong:

- A, FTA-ABS: a specific treponemal confirmatory test, not the screen.
- C, Weil-Felix: an agglutination test for rickettsial disease.
- D, Coombs test: detects antibodies on red cells in haemolytic anaemia.

Final Answer: VDRL / RPR ⇒

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



Q15.

Solution

Concept – separating gram-positive cocci: A simple enzyme test tells staphylococci from streptococci.

Step 1 – name the test: The **catalase test** adds hydrogen peroxide to a colony and watches for oxygen bubbles.

Step 2 – interpret it: *Staphylococcus* is catalase-positive and bubbles briskly; *Streptococcus* is catalase-negative and gives no bubbles.

Why the other options are wrong:

- B, coagulase test: separates *S. aureus* from other staphylococci, not staph from strep.
- C, oxidase test: identifies *Pseudomonas* and *Neisseria*.
- D, urease test: detects *Proteus* and *H. pylori*.

Final Answer: Catalase test $\Rightarrow$ A

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



Answer Key

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

