

INI CET Microbiology

Sample Paper – 5

Duration: 14 Minutes

Maximum Marks: 15

Instructions

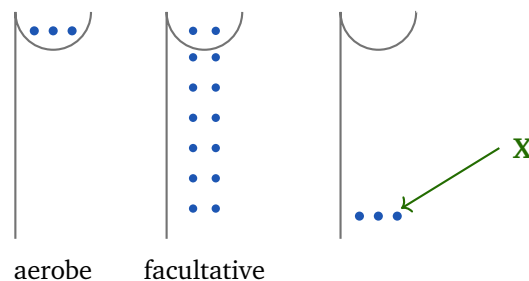
- This paper contains **15** Multiple Choice Questions (Single Best Response), modelled on the Microbiology content of **INI CET** (Institutes of National Importance Combined Entrance Test) conducted by AIIMS New Delhi.
- The **15-question** length matches the number of Microbiology items you actually 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 statement best defines a **selective medium** such as MacConkey agar?
- (A) It contains agents (for example bile salts) that suppress unwanted flora and permit only certain organisms to grow
- (B) It contains a pH indicator that lets different organisms be distinguished by colony colour
- (C) It supports the growth of every organism equally without any inhibition
- (D) It is a liquid medium used only to enrich fastidious anaerobes



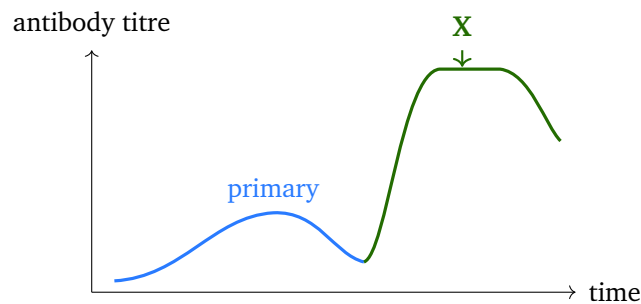
- Q2.** In the holder (low-temperature long-time) method of pasteurising milk, the milk is held at:
- (A) 100 °C for 10 minutes
 - (B) 63 °C for 30 minutes
 - (C) 121 °C for 15 minutes
 - (D) 37 °C for 24 hours
- Q3.** In the fluid thioglycollate tubes below, growth patterns reveal an organism's oxygen requirement. Which tube, marked **X**, shows the **obligate anaerobe** that grows only at the bottom?



- (A) The first tube, with growth only at the top
- (B) The second tube, with growth throughout
- (C) The third tube, with growth only at the bottom
- (D) None of the tubes shows anaerobic growth

Immunology

- Q4.** Which complement component is the central molecule at which the classical, alternative and lectin pathways all converge?
- (A) C1q
 - (B) C9
 - (C) C3
 - (D) C5a
- Q5.** The two antibody-titre curves below compare the primary and secondary responses to the same antigen. The steeper, larger secondary response (curve **X**) chiefly reflects:

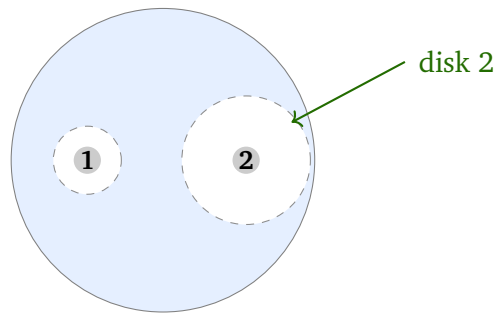


- (A) A slower, weaker reaction than the first exposure
- (B) The action of innate neutrophils only
- (C) Loss of antigen specificity on re-exposure
- (D) Rapid recall by memory B cells generated during the primary response

Systematic Bacteriology

- Q6.** A patient develops symmetric descending flaccid paralysis after eating home-canned food. The neurotoxin responsible blocks acetylcholine release at the neuromuscular junction. The causative organism is:
- (A) *Clostridium tetani*
 - (B) *Clostridium perfringens*
 - (C) *Clostridium botulinum*
 - (D) *Clostridium difficile*
- Q7.** In a patient with suspected enteric fever in the **first week** of illness, which specimen gives the highest diagnostic yield for *Salmonella* Typhi?
- (A) Stool culture
 - (B) Blood culture
 - (C) Urine culture
 - (D) Bone marrow biopsy alone
- Q8.** In the Kirby-Bauer plate below, two antibiotic disks produce zones of different size. Which disk shows the **greater susceptibility** of the organism?





- (A) Disk 1, because a smaller zone means more sensitivity
- (B) Both disks show equal susceptibility
- (C) Neither disk shows any inhibition
- (D) Disk 2, because the larger zone of inhibition means greater susceptibility

Virology

- Q9.** Biopsy of an infected cell shows a large intranuclear inclusion surrounded by a clear halo, giving an “owl-eye” appearance. This classic finding, seen in congenital infection and in retinitis in AIDS, points to:
- (A) Cytomegalovirus (CMV)
 - (B) Rabies virus
 - (C) Measles virus
 - (D) Human papillomavirus
- Q10.** A wheel-shaped virus with a double-stranded RNA genome is the commonest cause of severe gastroenteritis in infants and is now preventable by an oral vaccine. It is:
- (A) Rotavirus
 - (B) Norovirus
 - (C) Hepatitis A virus
 - (D) Coronavirus

Mycology and Parasitology



- Q11.** A diabetic patient in ketoacidosis develops rapidly progressive rhino-cerebral infection. Tissue shows broad, aseptate, ribbon-like hyphae branching at wide (near right-angle) angles. The likely agent is:
- (A) *Candida albicans*
 - (B) *Cryptococcus neoformans*
 - (C) *Aspergillus fumigatus*
 - (D) *Rhizopus* species (mucormycosis)
- Q12.** A child presents with intense nocturnal perianal itching. The infection is best diagnosed by the cellophane-tape (NIH swab) test applied to the perianal skin in the morning. The parasite is:
- (A) *Enterobius vermicularis*
 - (B) *Ascaris lumbricoides*
 - (C) *Ancylostoma duodenale*
 - (D) *Taenia saginata*
- Q13.** A sheep farmer with a dog is found to have a large fluid-filled cyst in the liver on imaging. The dog is the definitive host and sheep the intermediate host. The causative tapeworm is:
- (A) *Taenia solium*
 - (B) *Diphyllobothrium latum*
 - (C) *Echinococcus granulosus*
 - (D) *Hymenolepis nana*

Applied and Diagnostic Microbiology

- Q14.** Which technique amplifies a specific segment of pathogen nucleic acid through repeated cycles of denaturation, annealing and extension, enabling highly sensitive molecular diagnosis?
- (A) Latex agglutination
 - (B) PCR (polymerase chain reaction)



- (C) Gram staining
- (D) Complement fixation test

Q15. A biochemical test turns phenol red to a bright pink as the organism splits urea into ammonia. This urease test is characteristically positive for:

- (A) *Escherichia coli* and *Shigella*
- (B) *Proteus* and *Helicobacter pylori*
- (C) *Salmonella* and *Vibrio*
- (D) *Streptococcus* and *Enterococcus*



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

Concept – selective versus differential media: Culture media are designed either to inhibit some organisms or to tell organisms apart.

Step 1 – define selective media: A **selective medium** contains agents that **suppress unwanted flora** and let only certain organisms grow. MacConkey agar uses bile salts and crystal violet to inhibit gram-positive bacteria and select gram-negatives.

Step 2 – contrast with differential media: A differential medium uses an indicator to distinguish organisms by colony appearance; MacConkey is also differential (lactose fermenters turn pink), but the defining selective feature is inhibition of unwanted flora.

Why the other options are wrong:

- B: describes a *differential* medium, not the definition of selective.
- C: a medium that supports all organisms equally is a general-purpose (non-selective) medium.
- D: enrichment broths are a separate category; selective media need not be liquid or for anaerobes.

Final Answer: Suppresses unwanted flora, permits only certain organisms ⇒ A

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

Q2.**Solution**

Concept – pasteurisation of milk: Pasteurisation reduces pathogens and spoilage organisms without sterilising the milk.

Step 1 – recall the holder method: The holder (low-temperature long-time) method holds milk at **63 °C for 30 minutes**, then rapidly cools it.

Step 2 – the flash alternative: The flash (high-temperature short-time) method uses 72 °C for 15 seconds. Both kill *Mycobacterium bovis*, *Coxiella* and other milk-borne pathogens but leave spores.

Why the other options are wrong:

- A: 100 °C boiling is disinfection, hotter than pasteurisation.



- C: 121 °C for 15 minutes is autoclave sterilisation.
- D: 37 °C for 24 hours is an incubation temperature, not pasteurisation.

Final Answer: 63 °C for 30 minutes ⇒ B

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

Q3.

Solution

Concept – oxygen requirements in thioglycollate broth: Fluid thioglycollate has an oxygen gradient: oxygen-rich at the top, oxygen-free at the bottom.

Step 1 – read the tubes: Growth only at the top means an obligate aerobe. Growth throughout means a facultative anaerobe. Growth only at the **bottom** means an **obligate anaerobe**, which oxygen kills.

Step 2 – identify X: Tube **X** is the third tube, with bacteria settled at the oxygen-free bottom, so it is the obligate anaerobe.

Why the other options are wrong:

- A: top-only growth is the obligate aerobe.
- B: growth throughout is the facultative anaerobe.
- D: incorrect, because the bottom tube clearly shows anaerobic growth.

Final Answer: The third tube, growth only at the bottom ⇒ C

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

Q4.

Solution

Concept – the complement system: Three activation pathways feed into a common terminal sequence.

Step 1 – name the convergence point: **C3** is the central component. The classical, alternative and lectin pathways each generate a C3 convertase that cleaves C3, so all three converge here.

Step 2 – what follows C3: C3b opsonises microbes and drives the terminal pathway (C5 to C9) that forms the membrane attack complex.

Why the other options are wrong:

- A, C1q: triggers only the classical pathway.



- B, C9: acts late, forming the membrane attack complex, not the convergence point.
- D, C5a: a downstream anaphylatoxin produced after C3 activation.

Final Answer: C3 $\Rightarrow$

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

Q5.

Solution

Concept – primary versus secondary antibody response: Re-exposure to an antigen gives a faster, larger response than the first encounter.

Step 1 – read the curves: The primary response is small, slow and IgM-dominant. The secondary response, curve X, is fast, high and IgG-dominant.

Step 2 – explain X: The steeper secondary response reflects **rapid recall by memory B cells** generated during the primary response, which proliferate quickly and class-switch to high-affinity IgG.

Why the other options are wrong:

- A: the secondary response is stronger, not weaker.
- B: innate neutrophils do not make antigen-specific antibody.
- C: memory keeps the same specificity; it is not lost.

Final Answer: Rapid recall by memory B cells $\Rightarrow$

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

Q6.

Solution

Concept – botulism: A preformed neurotoxin in improperly preserved food causes flaccid paralysis.

Step 1 – match the clues: Descending flaccid paralysis after home-canned food and a toxin that blocks acetylcholine release point to *Clostridium botulinum*.

Step 2 – mechanism: Botulinum toxin cleaves SNARE proteins, preventing acetylcholine release at the neuromuscular junction, so muscles cannot contract (flaccid paralysis).

Why the other options are wrong:



- A, *C. tetani*: its toxin blocks inhibitory neurotransmitters, causing *spastic* (rigid) paralysis.
- B, *C. perfringens*: causes gas gangrene and food poisoning, not this neuro-toxic paralysis.
- D, *C. difficile*: causes antibiotic-associated colitis.

Final Answer: *Clostridium botulinum* ⇒

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

Q7.

Solution

Concept – diagnosis of enteric fever by week of illness: The yield of each specimen changes over the course of typhoid fever.

Step 1 – recall the timing: In the **first week**, the organism is in the bloodstream, so **blood culture** is the best specimen (positive in about 80% early on).

Step 2 – later specimens: Stool and urine cultures become positive mainly in the second and third weeks; the Widal antibody test rises only after the first week.

Why the other options are wrong:

- A, stool: higher yield in the second to third week.
- C, urine: positive later, lower overall yield.
- D, bone marrow: the single most sensitive culture overall, but it is invasive and not the first-week routine choice; blood culture is the best practical answer.

Final Answer: Blood culture ⇒

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

Q8.

Solution

Concept – interpreting zone size in Kirby-Bauer testing: Antibiotic diffuses from each disk; the clear ring around it is the zone of inhibition.

Step 1 – compare the disks: Disk 2 has a clearly larger clear zone than disk 1.

Step 2 – interpret it: A larger zone of inhibition means greater susceptibility, because the drug inhibits growth over a wider area. So disk 2 shows the greater susceptibility.



Why the other options are wrong:

- A: a smaller zone means *less* sensitivity, not more.
- B: the zones are visibly unequal, so susceptibility is not equal.
- C: both disks show a clear zone, so both cause some inhibition.

Final Answer: Disk 2, larger zone means greater susceptibility ⇒ D

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

Q9.

Solution

Concept – owl-eye inclusion bodies: A large intranuclear inclusion with a surrounding halo is a hallmark of one herpesvirus.

Step 1 – identify the virus: The “owl-eye” intranuclear inclusion is classic for **Cytomegalovirus (CMV)**, a member of the Herpesviridae.

Step 2 – the clinical setting: CMV causes congenital infection (with sensorineural deafness and periventricular calcification) and, in AIDS, causes retinitis and colitis.

Why the other options are wrong:

- B, rabies: shows cytoplasmic Negri bodies, not owl-eye nuclear inclusions.
- C, measles: gives Warthin-Finkeldey giant cells, not owl-eye cells.
- D, HPV: produces koilocytes, not intranuclear owl-eye inclusions.

Final Answer: Cytomegalovirus (CMV) ⇒ A

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

Q10.

Solution

Concept – viral causes of infantile gastroenteritis: Several viruses cause diarrhoea; morphology and genome type separate them.

Step 1 – match the description: A **wheel-shaped** virion with a **double-stranded** RNA genome is **Rotavirus** (the name comes from the Latin *rota*, wheel).

Step 2 – clinical relevance: Rotavirus is the commonest cause of severe dehydrating gastroenteritis in infants and is now preventable by an oral live vaccine.

Why the other options are wrong:



- B, norovirus: a non-enveloped single-stranded RNA calicivirus; common in outbreaks, not wheel-shaped.
- C, hepatitis A: causes hepatitis, not gastroenteritis.
- D, coronavirus: enveloped, crown-like, single-stranded RNA; mainly respiratory.

Final Answer: Rotavirus $\Rightarrow$

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

Q11.

Solution

Concept – mucormycosis: An aggressive mould infection strikes diabetics in ketoacidosis.

Step 1 – read the morphology: Broad, **aseptate**, ribbon-like hyphae branching at wide (near right-angle) angles are characteristic of *Rhizopus* / *Mucor* (order Mucorales).

Step 2 – the setting: Rhino-orbital-cerebral mucormycosis classically occurs in diabetic ketoacidosis and other immunocompromised states, spreading rapidly by angioinvasion.

Why the other options are wrong:

- A, *Candida*: budding yeast with pseudohyphae, not broad aseptate hyphae.
- B, *Cryptococcus*: capsulated yeast, not a filamentous mould.
- C, *Aspergillus*: *septate* hyphae with acute-angle (45°) branching, the key contrast.

Final Answer: *Rhizopus* species (mucormycosis) $\Rightarrow$

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

Q12.

Solution

Concept – pinworm infection: Nocturnal perianal itch in a child has a classic parasitic cause and test.

Step 1 – identify the parasite: *Enterobius vermicularis*, the pinworm, lays eggs on the perianal skin at night, causing intense itching.

Step 2 – the diagnostic test: Diagnosis uses the **cellophane-tape** (NIH swab)



test: adhesive tape pressed on the perianal skin in the morning collects eggs, which are then seen under the microscope.

Why the other options are wrong:

- B, *Ascaris*: large roundworm; diagnosed by eggs in stool, not tape test.
- C, *Ancylostoma*: hookworm; causes anaemia, eggs found in stool.
- D, *Taenia saginata*: beef tapeworm; proglottids and eggs in stool.

Final Answer: *Enterobius vermicularis* ⇒ A

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

Q13.

Solution

Concept – hydatid disease: A dog tapeworm forms fluid-filled cysts in human organs.

Step 1 – name the parasite: *Echinococcus granulosus* causes hydatid cysts, most often in the liver and lung.

Step 2 – the life cycle: The **dog** is the definitive host harbouring the adult worm; **sheep** (and humans as accidental hosts) are intermediate hosts carrying the cyst. This fits the sheep-farmer-with-dog history.

Why the other options are wrong:

- A, *Taenia solium*: pork tapeworm; causes cysticercosis (often neurocysticercosis), not hydatid cysts.
- B, *Diphyllobothrium latum*: fish tapeworm; causes vitamin B12 deficiency.
- D, *Hymenolepis nana*: dwarf tapeworm; a small intestinal infection, no organ cysts.

Final Answer: *Echinococcus granulosus* ⇒ C

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



Q14.

Solution

Concept – nucleic-acid amplification: Molecular diagnosis can copy a target sequence millions of times.

Step 1 – name the technique: PCR (polymerase chain reaction) amplifies a specific DNA segment through repeated cycles of denaturation, primer annealing and extension by a heat-stable polymerase.

Step 2 – its value: PCR allows highly sensitive and specific detection of pathogens, even when very few organisms are present or the organism is hard to culture.

Why the other options are wrong:

- A, latex agglutination: detects antigen or antibody, not amplified nucleic acid.
- C, Gram staining: shows morphology, not a specific gene.
- D, complement fixation: a serological antibody test, not amplification.

Final Answer: PCR (polymerase chain reaction) ⇒ **B**

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

Q15.

Solution

Concept – the urease test: Some bacteria hydrolyse urea into ammonia, raising the pH.

Step 1 – the reaction: Urease splits urea into ammonia and carbon dioxide. The ammonia raises the pH and turns phenol red from orange-yellow to **bright pink**.

Step 2 – name the positive organisms: The test is strongly positive for *Proteus* (rapid urease) and *Helicobacter pylori* (basis of the urea breath test and rapid urease test).

Why the other options are wrong:

- A, *E. coli* and *Shigella*: urease negative.
- C, *Salmonella* and *Vibrio*: urease negative.
- D, *Streptococcus* and *Enterococcus*: not urease-based; identified by other tests.

Final Answer: *Proteus* and *Helicobacter pylori* ⇒ **B**



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



Answer Key

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

