

INI CET Microbiology

Sample Paper – 10

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.

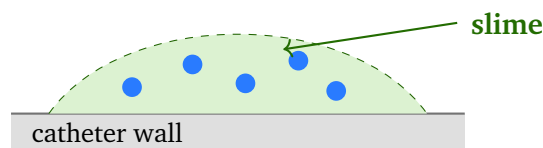
General Microbiology and Sterilization

- Q1.** Members of the genera *Rickettsia* and *Chlamydia* share the feature that they:
- (A) Grow readily on ordinary nutrient agar
 - (B) Are motile by peritrichous flagella
 - (C) Are obligate intracellular bacteria that cannot grow on inert artificial media
 - (D) Form heat-resistant endospores
- Q2.** Which sterilization method involves holding an inoculating loop or straight wire in a Bunsen flame until it becomes red hot?



- (A) Filtration through a membrane filter
- (B) Tyndallisation
- (C) Incineration by red-heat (flaming)
- (D) Ethylene oxide gas exposure

Q3. The diagram shows a bacterial biofilm growing on the inner surface of an indwelling catheter, with cells embedded in a slime layer. Which component chiefly protects the enclosed bacteria from antibiotics?



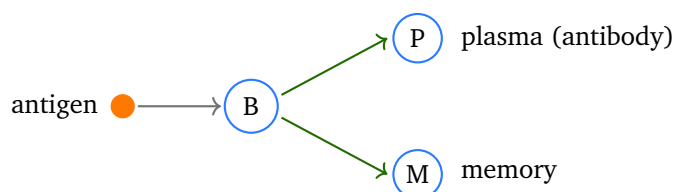
- (A) The extracellular polymeric (polysaccharide) matrix
- (B) A thick peptidoglycan sacculus
- (C) Bacterial flagella
- (D) The 70S ribosome

Immunology

Q4. A small molecule that is not immunogenic by itself but becomes able to trigger an immune response only when it is coupled to a larger carrier protein is called a:

- (A) Hapten
- (B) Adjuvant
- (C) Superantigen
- (D) Complete antigen

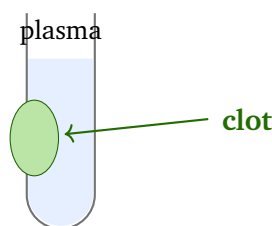
Q5. In the clonal selection diagram below, a specific antigen selects one matching B lymphocyte, which then proliferates. Into which two cell types does the selected B cell principally differentiate?



- (A) Neutrophils and eosinophils
- (B) Plasma cells and memory cells
- (C) Cytotoxic T cells and NK cells
- (D) Macrophages and dendritic cells

Systematic Bacteriology

- Q6.** A thin spiral spirochaete that causes syphilis and cannot be grown on artificial culture media is:
- (A) *Borrelia burgdorferi*
 - (B) *Leptospira interrogans*
 - (C) *Neisseria gonorrhoeae*
 - (D) *Treponema pallidum*
- Q7.** Which organism, the cause of Legionnaires' disease, requires buffered charcoal yeast extract (BCYE) agar supplemented with cysteine and iron for its growth?
- (A) *Legionella pneumophila*
 - (B) *Bordetella pertussis*
 - (C) *Haemophilus influenzae*
 - (D) *Klebsiella pneumoniae*
- Q8.** In the tube coagulase test shown below, plasma is mixed with a staphylococcal isolate and a firm clot forms. This positive result identifies the organism as:



- (A) Coagulase-negative *Staphylococcus epidermidis*



- (B) Coagulase-positive *Staphylococcus aureus*
- (C) *Streptococcus pyogenes*
- (D) *Enterococcus faecalis*

Virology

- Q9.** A transmissible agent made only of a misfolded host protein (PrP), lacking any nucleic acid and resistant to routine sterilisation, causes Creutzfeldt-Jakob disease. This agent is a:
- (A) Viroid
 - (B) Bacteriophage
 - (C) Defective satellite virus
 - (D) Prion
- Q10.** A non-enveloped double-stranded DNA virus that causes respiratory infections and epidemic keratoconjunctivitis is:
- (A) Rotavirus
 - (B) Influenza virus
 - (C) Rabies virus
 - (D) Adenovirus

Mycology and Parasitology

- Q11.** A child with scalp ringworm (tinea capitis) shows hairs coated by ectothrix spores that give a bright green fluorescence under a Wood's lamp. The most likely dermatophyte genus is:
- (A) *Epidermophyton*
 - (B) *Microsporum*
 - (C) *Malassezia*
 - (D) *Sporothrix*
- Q12.** Which tapeworm is acquired by eating undercooked beef and, unlike its pork counterpart, does not cause human cysticercosis?



- (A) *Taenia solium*
- (B) *Taenia saginata*
- (C) *Echinococcus granulosus*
- (D) *Hymenolepis nana*

Q13. In the life cycle of *Plasmodium*, which host is the definitive host that injects sporozoites into humans during a blood meal?

- (A) The female *Anopheles* mosquito
- (B) The human liver cell
- (C) The human red blood cell
- (D) The male *Culex* mosquito

Applied and Diagnostic Microbiology

Q14. Which cartridge-based automated test rapidly detects *Mycobacterium tuberculosis* DNA and simultaneously reports rifampicin resistance?

- (A) Ziehl-Neelsen smear microscopy
- (B) Lowenstein-Jensen culture
- (C) Nucleic acid amplification test (GeneXpert / cartridge NAAT)
- (D) Mantoux tuberculin test

Q15. Which immunodiffusion (precipitation-in-gel) test is used to demonstrate toxin production by *Corynebacterium diphtheriae*?

- (A) Widal test
- (B) Weil-Felix reaction
- (C) Elek test
- (D) Coombs test



Detailed Solutions

Q1.

Solution

Concept – obligate intracellular bacteria: Some bacteria depend on host cells for growth.

Step 1 – recall the two genera: *Rickettsia* and *Chlamydia* are **obligate intracellular bacteria**; they need living host cells (cell culture, embryonated eggs or animals) and cannot be grown on inert artificial media.

Step 2 – why: *Chlamydia* cannot make its own ATP (an energy parasite) and *Rickettsia* has leaky membranes, so both must live inside cells.

Why the other options are wrong:

- A, ordinary agar: precisely what they cannot do.
- B, flagellar motility: not a shared defining feature here.
- D, endospores: formed by *Bacillus* and *Clostridium*, not these.

Final Answer: Obligate intracellular bacteria ⇒

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

Q2.

Solution

Concept – sterilization by dry heat: Direct flaming destroys organisms instantly.

Step 1 – name the method: Holding a loop or wire in a flame until red hot is **incineration by red-heat (flaming)**, a form of dry-heat sterilization.

Step 2 – the use: It is the everyday way to sterilise inoculating loops, wires and the mouths of culture tubes at the bench.

Why the other options are wrong:

- A, filtration: removes microbes from heat-sensitive liquids, no heat used.
- B, tyndallisation: intermittent steaming on three successive days.
- D, ethylene oxide: a cold chemical gas for heat-sensitive equipment.

Final Answer: Incineration by red-heat (flaming) ⇒

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



Q3.

Solution

Concept – biofilm resistance: Bacteria in a biofilm survive far higher antibiotic doses than free-floating cells.

Step 1 – read the figure: The cells sit inside a slime layer coating the catheter surface.

Step 2 – identify the shield: The **extracellular polymeric (polysaccharide) matrix** is the main protector; it slows drug penetration, traps enzymes and shelters slow-growing, tolerant cells.

Why the other options are wrong:

- B, peptidoglycan wall: present in all bacteria, not what makes a biofilm resistant.
- C, flagella: aid attachment but do not block antibiotics.
- D, 70S ribosome: the drug target, not a defence.

Final Answer: Extracellular polymeric matrix ⇒ A

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

Q4.

Solution

Concept – haptens: Immunogenicity depends on molecular size.

Step 1 – define it: A **hapten** is a small molecule that can bind antibody but is too small to trigger a response on its own; it becomes immunogenic only when linked to a large carrier protein.

Step 2 – an example: Penicillin acts as a hapten, coupling to serum proteins to cause drug allergy.

Why the other options are wrong:

- B, adjuvant: boosts a response but is not the antigen itself.
- C, superantigen: activates many T cells non-specifically.
- D, complete antigen: already immunogenic without a carrier.

Final Answer: Hapten ⇒ A

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



Q5.

Solution

Concept – clonal selection: An antigen picks out the one lymphocyte whose receptor fits it.

Step 1 – read the figure: The antigen selects a single matching B cell, which then divides.

Step 2 – name the products: The selected B cell differentiates into **plasma cells**, which secrete antibody, and **memory cells**, which give faster future responses.

Why the other options are wrong:

- A, neutrophils/eosinophils: innate granulocytes, not B-cell progeny.
- C, cytotoxic T/NK cells: separate lineages, not from a B cell.
- D, macrophages/dendritic cells: antigen-presenting cells, not B-cell derivatives.

Final Answer: Plasma cells and memory cells ⇒ B

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

Q6.

Solution

Concept – non-cultivable spirochaete: Syphilis is diagnosed without routine culture.

Step 1 – name the organism: *Treponema pallidum* is a thin, tightly coiled spirochaete that causes syphilis and cannot be grown on artificial media.

Step 2 – how it is found: It is seen by dark-ground microscopy of lesion fluid and confirmed by serology (VDRL, TPHA).

Why the other options are wrong:

- A, *Borrelia burgdorferi*: Lyme disease, cultivable in special media.
- B, *Leptospira*: grows in EMJH medium.
- C, *Neisseria gonorrhoeae*: a diplococcus, not a spirochaete.

Final Answer: *Treponema pallidum* ⇒ D

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



Q7.

Solution

Concept – fastidious growth requirements: Some pathogens need enriched, specialised media.

Step 1 – match the clue: *Legionella pneumophila* requires **buffered charcoal yeast extract (BCYE)** agar with L-cysteine and iron salts to grow.

Step 2 – the disease: It causes Legionnaires' disease, an atypical pneumonia often linked to contaminated water systems and air conditioning.

Why the other options are wrong:

- B, *Bordetella pertussis*: needs Bordet-Gengou or Regan-Lowe medium.
- C, *Haemophilus influenzae*: needs factors X and V on chocolate agar.
- D, *Klebsiella pneumoniae*: grows easily on ordinary media.

Final Answer: *Legionella pneumophila* ⇒ A

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

Q8.

Solution

Concept – the coagulase test: Coagulase clots plasma and marks the most pathogenic staphylococcus.

Step 1 – read the tube: A firm clot after mixing the isolate with plasma is a **positive** coagulase test.

Step 2 – identify the organism: A coagulase-positive result identifies *Staphylococcus aureus*, distinguishing it from other staphylococci.

Why the other options are wrong:

- A, *S. epidermidis*: coagulase-negative, no clot.
- C, *Streptococcus pyogenes*: a chain-forming coccus, catalase-negative.
- D, *Enterococcus faecalis*: bile-aesculin positive, coagulase not used.

Final Answer: Coagulase-positive *Staphylococcus aureus* ⇒ B

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



Q9.

Solution

Concept – prions: A unique infectious agent breaks the usual rules.

Step 1 – name it: A **prion** is a proteinaceous infectious particle, a misfolded form of the normal cellular protein PrP, containing no nucleic acid.

Step 2 – properties: Prions cause Creutzfeldt-Jakob disease and other spongiform encephalopathies and resist routine autoclaving, formalin and radiation.

Why the other options are wrong:

- A, viroid: a small naked RNA, infects only plants.
- B, bacteriophage: a virus that infects bacteria.
- C, satellite virus: a defective virus needing a helper virus.

Final Answer: Prion $\Rightarrow$

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

Q10.

Solution

Concept – non-enveloped DNA viruses: Structure and disease pattern point to the agent.

Step 1 – match the description: A **non-enveloped double-stranded DNA virus** causing respiratory disease and epidemic keratoconjunctivitis is **Adenovirus**.

Step 2 – extra features: Adenoviruses also cause pharyngoconjunctival fever and some cases of childhood gastroenteritis.

Why the other options are wrong:

- A, Rotavirus: a dsRNA virus causing diarrhoea.
- B, Influenza: an enveloped RNA virus.
- C, Rabies: an enveloped bullet-shaped RNA virus.

Final Answer: Adenovirus $\Rightarrow$

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



Q11.

Solution

Concept – dermatophytes and Wood's lamp: Some scalp ringworm fungi fluoresce.

Step 1 – read the clues: Ectothrix spores on the hair shaft with bright green fluorescence under a Wood's lamp point to *Microsporum*.

Step 2 – the disease: *Microsporum* species cause tinea capitis (scalp ringworm), commonly in children.

Why the other options are wrong:

- A, *Epidermophyton*: infects skin and nails, spares hair, non-fluorescent.
- C, *Malassezia*: causes pityriasis versicolor, not classic ectothrix scalp ringworm.
- D, *Sporothrix*: a subcutaneous dimorphic fungus, not a dermatophyte.

Final Answer: *Microsporum* ⇒

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

Q12.

Solution

Concept – beef versus pork tapeworm: The two *Taenia* species differ in host and human risk.

Step 1 – name it: *Taenia saginata*, the beef tapeworm, is acquired by eating undercooked beef containing cysticerci.

Step 2 – key point: Unlike *T. solium*, its eggs do not cause human cysticercosis, so humans are only the definitive host.

Why the other options are wrong:

- A, *Taenia solium*: pork tapeworm, does cause human cysticercosis.
- C, *Echinococcus granulosus*: causes hydatid cysts from dog contact.
- D, *Hymenolepis nana*: the dwarf tapeworm, faecal-oral spread.

Final Answer: *Taenia saginata* ⇒

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



Q13.

Solution

Concept – hosts in the malaria cycle: The definitive host is where sexual reproduction occurs.

Step 1 – identify it: The **female *Anopheles* mosquito** is the definitive host; the sexual cycle completes in it and it injects sporozoites into humans during a blood meal.

Step 2 – the human role: Humans are the intermediate host, where asexual liver and blood stages occur.

Why the other options are wrong:

- B, liver cell: site of the human exo-erythrocytic stage, not a host organism.
- C, red blood cell: site of the asexual erythrocytic stage.
- D, male *Culex*: males do not bite; *Culex* transmits filariasis, not malaria.

Final Answer: Female *Anopheles* mosquito ⇒ A

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

Q14.

Solution

Concept – rapid molecular TB diagnosis: A cartridge test speeds up tuberculosis detection.

Step 1 – name the test: The **nucleic acid amplification test (GeneXpert / cartridge NAAT)** amplifies *M. tuberculosis* DNA directly from sputum.

Step 2 – the added value: It also detects *rpoB* gene mutations, reporting rifampicin resistance within about two hours.

Why the other options are wrong:

- A, ZN smear: cheap but insensitive and gives no drug-resistance data.
- B, LJ culture: the gold standard but takes several weeks.
- D, Mantoux: measures exposure, not active disease or resistance.

Final Answer: GeneXpert / cartridge NAAT ⇒ C

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



Q15.

Solution

Concept – detecting diphtheria toxin: Toxigenicity must be proven, not just identity.

Step 1 – name the test: The **Elek test** is an immunodiffusion (gel precipitation) method in which antitoxin-impregnated paper meets toxin diffusing from the organism.

Step 2 – the result: Lines of precipitation appear where toxin and antitoxin meet, confirming toxigenic *Corynebacterium diphtheriae*.

Why the other options are wrong:

- A, Widal test: agglutination for enteric fever.
- B, Weil-Felix: agglutination screen for rickettsial disease.
- D, Coombs test: detects antibodies coating red cells.

Final Answer: Elek test $\Rightarrow$

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



Answer Key

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

