



Part 1 Examination in Medical Microbiology and Virology

Sample MCQs and EMQs

Multiple Choice Questions

Question 1

The cell wall of gram-positive bacteria may contribute to the development of septic shock.

Identify the component which is most associated with the induction of septic shock.

- A Capsular protein
- B Endotoxin
- C Peptidoglycan
- D Phospholipid
- E Teichoic acid

Question 2

Genetic variation in viruses contributes to their ability to evade the immuneresponse.

Select the principal means by which antigenic shift occurs in influenza A virus.

- A Low fidelity of DNA dependent DNA polymerase
- B Low fidelity of RNA dependent RNA polymerase
- C Low fidelity of reverse transcriptase
- D Reassortment of fragments of the RNA genome
- E Recombination between RNA genomes

Question 3

A 34 year old man with diabetic ketoacidosis develops headache, nasal congestion, periorbital swelling and a bloodstained nasal discharge. Over a period of a week he become drowsy and unresponsive. ENT examination shows black, necrotic lesions on the nasal septum, which is perforated. A lumbar puncture is performed but the CSF findings are entirely normal. Culture of the nasal discharge shows a heavy growth of *Streptococcus pneumoniae* and *Staphylococcus aureus*.

Select the most likely diagnosis.

- A Dental abscess
- B Nasal diphtheria
- C Orbital cellulitis
- D Rhinocerebral mucormycosis
- E Severe maxillary sinusitis

Question 4

The aminoglycosides are a very active group of antibacterial agents, particularly against Gram-negative bacilli.

Identify their mode of action from the list.

- A Disruption of cytoplasmic membrane function
- B Inhibition of bacterial cell wall synthesis
- C Inhibition of bacterial DNA gyrase
- D Inhibition of protein synthesis
- E Interference with bacterial folic acid metabolism

Question 5

A 22-year old female medical student recently returned from Tanzania presents with a history of haematuria. On investigation schistosomal serology is shown to be positive.

Select the treatment of choice.

- A Albendazole
- B Ivermectin
- C Mebendazole
- D Praziquantel
- E Suramin

Question 6

Many antiviral drugs act by inhibition of a viral DNA polymerase enzyme.

Select the virus for which this class of drugs would be effective.

- A Cytomegalovirus
- B Influenza
- C Measles
- D Mumps
- E Rabies

Question 7

You are informed of an outbreak of diarrhoea and vomiting amongst the 100 guests at a wedding reception. About two thirds of the guests became ill between 2 and 3 days after the reception. You obtain a list of guests and the menu for the buffet meal.

Select the most appropriate epidemiological investigation.

- A A case-control study
- B A correlational study
- C A cross-sectional study
- D A randomized controlled trial
- E A retrospective cohort study

Question 8

A 26 year old pregnant lady (17/40 gestation) consulted her general practitioner (GP) because her 2 year old son has a vesicular rash on his hands and in his mouth. The mother is concerned about her unborn child. The GP is experienced and confident of his diagnosis of hand foot and mouth disease, but telephones you regarding further management.

Choose the most appropriate advice.

- A Phone the local CCDC to find out if there is a current epidemic
- B Reassure the mother that there is no risk to the pregnancy
- C Refer the lady for fetal ultrasound scan
- D Send a vesicle fluid from the child for EM studies
- E Send blood for serological examination

Question 9

A mother takes her 6 year old son to her general practitioner (GP) extremely anxious because the child has that morning stabbed himself with a needle he found in a park frequented by drug users. Apart from a minor scratch to the right hand the child is otherwise well and has no past medical history of note.

Select the most appropriate action for the GP at this consultation.

- A Issue HIV post exposure prophylaxis to the child
- B Reassure the mother and suggest an accelerated course of Hepatitis B vaccine
- C Send the needle to the lab for testing
- D Suggest accelerated course of Hepatitis B vaccine and Hepatitis C immunization
- E Test the child for Hepatitis C, HIV, Hepatitis B surface antigen

Question 10

A 5 year old boy is seen in the paediatric respiratory clinic for regular review of his cystic fibrosis. He has a productive cough and a specimen is forwarded to the laboratory.

Select the culture medium which would be most appropriate to isolate *Haemophilus influenzae* from this patient.

- A Blood agar
- B Chocolate bacitracin agar
- C MacConkey agar
- D Methicillin mannitol salt agar
- E XLD agar

Question 11

You are asked to review the case of a 23 year old male student recently admitted with invasive meningococcal disease. He has made a good recovery but gives a history of a previous episode of meningococcal septicaemia when he was 15 years old. There is no history of other recurrent infections.

Select the most likely immunodeficiency state.

- A Adenosine deaminase deficiency
- B C7 deficiency
- C Job's syndrome (hyperimmunoglobulinaemia E, defective chemotaxis)
- D Myeloperoxidase deficiency
- E Selective IgM deficiency

Question 12

A 65 year old man has been commenced on standard quadruple therapy, including rifampicin, for suspected tuberculosis. He has an extensive past medical history and is taking an number of other medications.

Select the drug which is most likely to have a clinically significant interaction with rifampicin.

- A Benzylpenicillin
- B Nonsteroidal antiinflammatory
- C Proton pump inhibitor
- D Thiazide diuretic
- E Warfarin

Question 13

Blood donors in the United Kingdom are screened for evidence of infection with the organisms below. For most, the screening test is based on antibody detection and thus vulnerably to missing infections in the "window period" prior to seroconversion. The screening test universally used for one organism detects protein antigen and is thus less vulnerable to this problem.

Select the organism for which this test is available.

- A Hepatitis B virus
- B Hepatitis C virus
- C Human immunodeficiency virus (HIV)
- D Human T-lymphotropic virus type 1 (HTLV1)
- E *Treponema pallidum*

Question 14

A male baby is born at 39 weeks gestation with a petechial rash, low birthweight, hepatosplenomegaly and bilateral cataracts. This is thought to be due to an infection acquired while the baby was still *in utero*.

Select the condition which is most likely to cause this clinical presentation.

- A Cytomegalovirus
- B Group B streptococcus
- C Rubella virus
- D Toxoplasma gondii
- E Treponema pallidum

Question 15

The complement fixation test (CFT) has largely been replaced by improved assays for evidence of infection.

Select the organism for which CFT remains a useful laboratory diagnostic test of infection.

- A Coxiella burnetii
- B Cytomegalovirus
- C Herpes simplex virus
- D Neisseria gonorrhoeae
- E Parainfluenza type 3

Extended Matching Questions

Question 1

Option list

- A Chlorhexidine
- B Chloroxylenol disinfectant (e.g. 'Dettol')
- C Clear soluble phenolic disinfectant (e.g. 'Hycolin')
- D Downward-displacement autoclave (e.g. 121°C for 15 minutes)
- E Glutaraldehyde 2% solution
- F High-vacuum, high-temperature (porous load) autoclave
- G Hydrogen peroxide 3%
- H Hypochlorite solution (125 parts-per-million available chlorine)
- I Isopropanol 70%
- J Sodium dichloroisocyanurate granules or tablets (e.g. 'Presept')

For each of the scenarios below, choose the most appropriate method of disinfection or sterilization from the list of options. Each option may be used once, more than once, or not at all.

- 1 Hand disinfection prior to a surgical operation
- 2 Treatment of a colonoscope between patients on an endoscopy list
- 3 Management of a blood spill from a patient thought to be hepatitis B- positive
- 4 Decontamination of a stethoscope following use on a patient positive for methicillin-resistant *Staphylococcus aureus* (MRSA)
- 5 Treatment of a surgical instrument set used in an appendectomy

Question 2

Option list

- A Amoxicillin
- B Ceftazidime
- C Chloramphenicol
- D Ciprofloxacin
- E Flucloxacillin
- F Gentamicin
- G Nitrofurantoin
- H Polymyxin B
- I Tetracycline
- J Vancomycin

For each of the following resistance mechanisms, select the one which is most frequently associated with one of the antibiotics in the list of options. Each option may be used once, more than once, or not at all.

1. Inactivation by enzymes such as acetyltransferases, phosphotransferases, or adenylyltransferases
2. Production of an altered DNA gyrase which has reduced affinity for the antibiotic
3. Production of a new penicillin-binding protein which has reduced affinity for the antibiotic
4. Inactivation by chromosomally-mediated (constitutive) beta-lactamase enzymes
5. Alteration in the pentapeptide side chain of bacterial peptidoglycan, resulting in failure to bind the antibiotic

Question 3

Option list

- A Inhaled zanamivir
- B Intravenous aciclovir
- C Intravenous ganciclovir
- D Oral aciclovir
- E Oral amantadine
- F Oral ganciclovir
- G Oral lamivudine
- H Oral ribavirin and subcutaneous interferon
- I Oral zidovudine monotherapy
- J Treatment is not indicated

For each clinical scenario below, select the most appropriate treatment from the list of options. Each option may be used once, more than once, or not at all.

- 1 14 week pregnant woman with severe chicken pox pneumonia.
- 2 HIV patient with newly diagnosed bilateral cytomegalovirus retinitis.
- 3 45 year old West African man who is HbeAg positive and has chronic active hepatitis B infection.
- 4 Bone marrow transplant patient with respiratory symptoms, whose nasopharyngeal aspirate is positive for influenza B by immunofluorescence.
- 5 42 year old woman with chronic active hepatitis C infection, confirmed on liver biopsy.

Question 4

Option list

- A *Acinetobacter baumannii*
- B *Brucella melitensis*
- C *Haemophilus parainfluenzae*
- D *Helicobacter pylori*
- E *Klebsiella aerogenes*
- F *Pseudomonas aeruginosa*
- G *Salmonella enteritidis*
- H *Shigella sonnei*
- I *Stenotrophomonas maltophilia*
- J *Vibrio cholerae*

For each of the following clinical and laboratory scenarios, select the most likely organism from the list of options. Each option may be used once, more than once, or not at all.

- 1 Meropenem-resistant organism isolated from the sputum of a patient in ICU.
- 2 Oxidase-positive organism isolated from the aerobic bottle only of a set of blood cultures from a patient with neutropaenic sepsis.
- 3 Oxidase-negative, multi-antibiotic resistant coccobacillus, isolated from the environment in an ICU.
- 4 Indole-negative and late lactose fermenter isolated from a child with diarrhoea in a crèche.
- 5 Short or small bacillus isolated from blood cultures after 5 days from a patient being investigated for pyrexia of unknown origin.

Question 5

Option list

- A Calymmatobacterium granulomatis
- B Candida albicans
- C Chlamydia trachomatis
- D Cryptococcus neoformans
- E Haemophilus ducreyi
- F Herpes simplex virus, type 2
- G Human papilloma virus type 6
- H Neisseria gonorrhoeae
- I Treponema pallidum
- J Trichomonas vaginalis

For each of the following clinical scenarios, select the most likely infecting organism from the list of options. Each option may be used once, more than once, or not at all.

- 1 A 17 year old heterosexual male presents to his general practitioner with a 24 hour history of painful dysuria and a thin urethral discharge. Nothing abnormal is found on examination. A Gram-stained smear of a urethral swab shows numerous pus cells and scattered intra-and extra-cellular Gram-negative diplococci.
- 2 A 30 year old heterosexual male treated for gonococcal urethritis returns to the surgery 5 days later with a relapse of dysuria and urethral discharge. Bacterial culture of a urethral swab is reported as negative.
- 3 A 38 year old homosexually-active male presents with a painless ulcer at the anal margin. He has had a steady partner for 5 years and not left the UK during the past 2 years, but had receptive anal intercourse with a new partner 3 weeks ago.
- 4 A 25 year old female presents with a short history of severe vulvo-vaginal inflammation and whitish discharge. She denies having had intercourse for the past month. Two weeks ago she had an episode of dysuria which was treated by her general practitioner with a 5 day course of amoxicillin.
- 5 A 25 year old woman presents with dysuria and vaginal soreness. She admits to several similar episodes during the past year. On examination the external genitalia show extensive inflammation with a few vesicular lesions on the periphery.