



**THE KENYA POLYTECHNIC UNIVERSITY
COLLEGE**

**SCHOOL OF HEALTH SCIENCES AND
TECHNOLOGY**

**DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES
AND TECHNOLOGY**

DIPLOMA IN MEDICAL LABORATORY SCIENCES

FINAL YEAR EXAMINATION

MEDICAL MICROBIOLOGY

TIME: 3 HOURS

INSTRUCTIONS

This paper consists of TWO SECTIONS: A and B.

Answer **ALL** questions in SECTION A and B.

Circle the letters of **ALL** correct answers in each multiple choices questions

Any wrong answer for multiple choices will be penalized (0.5 marks)

SECTION A (40 MARKS)

1. A child is diagnosed with Pertussis. How was this infection acquired?
 - a) Release of oral flora into the bloodstream by dental work.
 - b) Contact with livestock or animal products such as leather or wool.
 - c) Consumption of dairy products made from unpasteurized milk
 - d) Inhalation of respiratory droplets of another human being.
2. A pregnant woman develops septicemia. Blood cultures produce a small, motile, β -hemolytic, Gram positive rod that does not form spores. Identify the microorganism.
 - a) *Listeria monocytogenes*.
 - b) *Bacillus anthracis*.
 - c) *Clostridium perfringens*.
 - d) *Clostridium tetani*.
3. A burns patient develops infection. Culture of exudate on Brain-Heart Infusion agar produces numerous *green-pigmented* colonies of a Gram-negative rod. Identify the microorganism.
 - a) *Campylobacter fetus*
 - b) *Francisella tularensis*
 - c) *Pseudomonas aeruginosa*
 - d) *Escherichia coli*
4. Bipolar staining is characteristic of;
 - a) *Yersinia perstis*
 - b) *Proteus mirabilis*
 - c) *Pseudomonas aeruginosa*
 - d) *Shigella flexneri*
5. The most common cause of urinary tract infection in a community is;
 - a) *Proteus vulgaris*
 - b) *Citrobacter freundii*
 - c) *Escherichia coli*
 - d) *Klebsiella pneumoniae*
6. Which of the following media is used for blood culture in cases of enteric fever?
 - a) Bile broth
 - b) Tetrathionate broth
 - c) Selenite -F broth
 - d) Serum broth
7. Which of the following organisms is an opportunistic pathogen causing urinary tract, wound infections and formation of kidney stones?
 - a) *Klebsiella pneumoniae*
 - b) *Escherichia vulgaris*
 - c) *Proteus vulgaris*
 - d) *Citrobacter freundii*

8. Which of the following bacteria shows swarming on blood agar?
- Proteus mirabilis*
 - Morganella morganii*
 - Providencia rettgeri*
 - Providencia stuartii*
9. Systemic mycoses infects the following body parts;
- Skin, hairs, nails
 - Lungs, CNS, bones, visceral organs
 - Skin, subcutaneous organs
 - Skin, cutaneous, subcutaneous organs
10. Subcutaneous mycoses is acquired through the following;
- Inoculation of saprophytic fungi
 - Ingestion of saprophytic fungi
 - Contact with saprophytic fungi
 - Inhalation of saprophytic fungi
11. What is the purpose of 10% KOH in the laboratory diagnosis of dermatophytes in direct microscopy;
- To dissolve and clear extraneous materials.
 - To moisten the specimens
 - To emulsify the specimens
 - To evaporate the specimens
12. A person with AIDS dies of disseminated infection. On autopsy there are multiple foci of infection in all organ systems. Culture yields acid-fast aerobic rods. Which of the pathogens below is most likely?
- A non-cholera *Vibrio*.
 - Mycobacterium marinum*.
 - Mycobacterium leprae*.
 - Mycobacterium avium-intracellulare*.
13. A 67-year-old man with chronic pulmonary disease develops pneumonia caused by *Streptococcus pneumoniae*. What is the most important virulence factor of this bacterium?
- A polysaccharide capsule.
 - A variety of secreted proteases.
 - A surface protein which inhibits complement activation.
 - Protein fibriae which attach bacteria tightly to lung epithelial cells.
14. Traveler's diarrhea is caused by:
- Enteropathogenic *Escherichia coli*
 - Enteroinvasive *E. coli*
 - Enterotoxigenic *E. coli*
 - Enterotoxigenic *E. coli*

15. What medium would you use to grow *Staphylococcus aureus* from a wound swab?
- Mannitol salt agar
 - Tellurite blood agar
 - Bordet-Gengou agar
 - Alkaline peptone water
16. Which of the following is not a toxin produced by *Staphylococcus aureus*?
- Leucocidin
 - Exfoliatin
 - Hyaluronidase
 - Tetanospasmin
17. What medium would you use to grow *Mycobacterium tuberculosis* from sputum?
- Chocolate agar
 - Tellurite blood agar
 - Bordet-Gengou plates
 - Middlebrooke 7H11 agar
18. Scalded skin syndrome is due to which toxin of *Staphylococcus aureus*?
- Enterotoxin
 - Leucocidin
 - Epidermolytic toxin
 - Haemolysin
19. An elderly hospitalized patient has developed lobar pneumonia. Which of the following organisms could be suspected?
- Haemophilus influenza*
 - Klebsiella pneumonia*
 - Streptococcus pyogenes*
 - Proteus vulgaris*
20. Which of the following antimicrobial agent(s) is (are) incorporated in Thayer-Martin medium?
- Gentamicin
 - Vancomycin.
 - Tetracycline
 - Penicillin
21. The most common route of entry of gonococci in human is:
- Mucosa of alimentary tract
 - skin
 - mucosa of genitourinary tract
 - mucosa of respiratory tract.
22. *Treponema pallidum* cannot be demonstrated by microscopy in:
- Primary syphilis

- (b) Secondary syphilis
- (c) Congenital syphilis
- (d) Latent syphilis

23. Which of the following bacteria is involved in the production of dental caries ?

- a) *Streptococcus pneumoniae*
- b) *Streptococcus pyogenes*
- c) *Streptococcus viridans*
- d) *Streptococcus agalactiae*

24. 'Medusa head' appearance of colonies is characteristic of :

- a) *Mycobacterium tuberculosis*
- b) *Bacillus cereus*
- c) *Bacillus anthracis*
- d) *Clostridium tetani*

25. The commonest cause of gas gangrene is:

- a) *Clostridium perfringens*.
- b) *Clostridium difficile*.
- c) *Clostridium tetani*.
- d) *Clostridium botulinum*

26. Regarding BCG (Bacillus-Calmette-Guerin) vaccine, one statement is FALSE:

- a) it contains a strain of avirulent *Mycobacterium bovis*.
- b) it is administered intravenously.
- c) it produces some protection against pulmonary tuberculosis.
- d) it reduces the incidence of millitary and tuberculous meningitis in children.

27. Pneumonic plague can be transmitted from man to man by:

- (a) inoculation
- (b) ingestion
- (c) contact
- (d) droplet infection

28. The colonies of *Vibrio cholera* and *Vibrio parahaemolyticus* can be differentiated on:

- (a) alkaline peptone water
- (b) MacConkey agar
- (c) Thiosulphate –citrate –bile-sucrose agar
- (d) Modified Thayer-Martin medium

29. Which of the following species of *Brucella* is most pathogenic to man?

- (a) *Brucella abortus*
- (b) *Brucella canis*
- (c) *Brucella suis*
- (d) *Brucella mellitensis*

30. A patient has a skin ulcer you suspect is caused by *Bacillus anthracis*. If your hypothesis is true, which of the following would you expect to see in a Gram-stained smear of exudate from the wound?

- a) Slender spirochetes.
 - b) Small Gram-positive cocci, in pairs.
 - c) Large Gram-positive rods.
 - d) Gram-negative rods of variable length
31. What is the colonization site of *Corynebacterium diphtheriae*?
- a) skin
 - b) urethra
 - c) eye
 - d) throat
32. Which of the following properties is not seen in the members of the family Enterobacteriaceae?
- a) They are catalase positive
 - b) They are oxidase-positive
 - c) They do ferment glucose
 - d) They reduce nitrates to nitrites
33. Leprosy may be acquired by a susceptible person through:
- a) Skin contact
 - b) Ingestion of contaminated water
 - c) Inhalation of bacterial aerosols
 - d) Injection with lepromin toxin
34. Stuart transport medium is used for transport of specimen containing:
- a) *Salmonella spp*
 - b) *Vibrio cholera*
 - c) *Neisseria gonorrhoea*
 - d) *Clostridium tetani*
35. Which of the following animal models can be used for cultivation of *Mycobacterium leprae*?
- a) Mice
 - b) Guinea pigs
 - c) Armadillo
 - d) One day old chick
36. The problem of drug resistance has assumed alarming proportions in:
- a) *Escherichia coli*
 - b) *Mycobacterium tuberculosis*
 - c) *Mycobacterium leprae*
 - d) *Salmonella typhi*
37. For detection of carriers in enteric fever, which of the following specimen is most important?
- a) Sputum
 - b) Urine
 - c) Blood
 - d) Faeces

38. Which toxin acts on the neuromuscular junction by inhibiting the release of acetylcholine?
- a) Cholera toxin
 - b) Tetanus toxin
 - c) Botulinal toxin
 - d) Diphtheria toxin
39. Latent syphilis is associated with all the following EXCEPT:
- a) The presence of clinical lesion.
 - b) Negative dark-field examination.
 - c) Positive non-treponemal serological test.
 - d) Positive treponemal serological test.

SECTION B(60 MARKS)

40. (a) Discuss pathogenesis of *Bacillus anthracis* in humans. (15 marks)
(b) Outline the transmission and prevention measures for typhoid in humans. (5 marks)
41. Discuss *Neisseria gonorrhoea* under the following headings:
a) Morphology (3 marks)
b) Pathogenesis in males and females (17 marks)
42. Outline the following tests:
a) Agar diffusion method for sensitivity testing. (10 marks)
b) Most probable number (MPN) for coliform count. (10 marks)