namibia university
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION: BACHELOR OF BIOMEDICAL SCIENCES	
QUALIFICATION CODE: 50BBMS	LEVEL: 8
COURSE CODE: ICP420S	COURSE NAME: INTEGRATED CLINICAL PATHOPHYSIOLOGY
SESSION: JANUARY 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 130

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.

PERMISSIBLE MATERIALS
1. CALCULATOR

THIS QUESTION PAPER CONSISTS OF 5 PAGES (including this front page)

SECTION A [70]

QUESTION 1 [10]

Identify the AML best described by each of the following FAB descriptions:

a	(Abnorrmal bone marrow eosinophils), Central nervous system involvement, Slide: increased eosinophils, hypersegmented with large abnormal granules, blasts with/out Auer rods, monocytes increased, SB/ MPO >3% +, CD33, CD13, MPO, CD11b, FISH/PCR: Inv(16;16)
b	(Megakaryocytic), Slide: Blasts are pleomorphic, Bizarre platelets, bare nuclei, micro-megakaryoblasts, Dry tap: fibrosis, MPO, SB – , CD41, CD42, CD61
c	Without maturation, hepatosplenomegaly, Slide: increased myeloblasts, Auer rods +/-, monocytes <1%, ≥3% + with SB or MPO, Immunophenotyping: CD117, MPD
d	Monocytic, CNS involvement, Slide: Monocytes + Promonocytes (25 -75%), MPO –, CD11b , Increased muramidase
e	Predominant erythroid features, hepatomegaly , Slide: increased in both myeloid and erythroid precursors, BM: erythroblasts >50% of all nucleated cells, Iron laden mitochondria and ferritin molecules with electron microscopy, CD13, CD33, + transferrin receptor

QUESTION 2 [10]

2.1 Describe the pathophysiology of the abnormal haemoglobin S? (4)

2.2 Explain how the red cell indices (MCV, MCH and MCHC) are calculated by automated cell counters. (6)

QUESTION 3 [10]

A man is admitted to the emergency department with dehydration. His breath has a fruity smell. His urine dipstick results indicate very high glucose and ketones results.

3.1 Predict the disease described above. (1)

3.2 Briefly describe the pathophysiology of the disease. (3)

3.3 Discuss the outcome of the following investigations in this patient. Indicate the expected results (low, normal or high). Justify the choice of result: Serum sodium, potassium, urea, bicarbonate, anion gap and arterial blood pH. (6)

QUESTION 4 [10]

4.0 A 32 year old man presents at his GP with suspected jaundice. Serum total bilirubin is reported to be 100 µmol/L. Discuss other **BIOCHEMICAL** tests which could be carried out to indicate the cause of the high total bilirubin.

QUESTION 5   [10]

5.1 Identify the test commonly used to distinguish between *Staphylococci* and *Streptococci*.(1)

5.2 Tabulate the differences between *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Staphylococcus saprophyticus* under the following headings:

DNAse, coagulase, Novobiocin sensitivity   (9)

	DNAse	Coagulase	Novobiocin sensitivity
S. aureus			
S. epidermidis			
S. saprophyticus			

QUESTION 6   [10]

6.0 Answer the following questions which relate to tuberculosis (TB) diagnosis and management:

6.1 Define XDR TB.   (4)

6.2 Explain the principle of the GeneXpert in TB diagnosis and rifampicin resistance.   (6)

QUESTION 7   [10]

7.1 Define the following: (4)

a. Okazaki fragments

b. DNA polymerase III

c. Helicase

d. Primase

7.2 Discuss the main stages of a PCR reaction.   (6)

SECTION B [60]

QUESTION 8   [30]

A 66 year old male with known CLL is admitted to ICU with severe lung infection and pleural effusion. Blood, sputum and pleural fluid samples are submitted to the laboratory for analysis.

The following are some of the results obtained:

Chemistry	Microbiology – Sputum MC&S
Serum Total bilirubin: 22 µmol/L Direct bilirubin: 5 µmol/L Total protein: 65 g/L Albumin: 31 g/L AST: 35 U/L ALT: 42 U/L GGT: 22 U/L ALP: 166 U/L LDH: 488 U/L Total calcium: 2.68 mmol/L UA: 0.67 mmol/L **Pleural effusion** LDH: 421 U/L Total protein: 45 g/L **ABG** pH: 7.31 pCO_2: 7.2 kPA (4.67-6.00 kPA) HCO_3: 24 mmol/L (22-29 mmol/L)	*Klebsiella pneumoniae* isolated

8.1 Comment on the patient's serum LDH, UA and calcium levels. (3)

8.2 Calculate the corrected calcium. (2)

8.3 Classify the fluid either as a transudate or exudate. Motivate your answer. (4)

8.4 State the patient's acid base status. (1)

8.5 Describe the colonial morphology of *K. pneumoniae* on a blood agar plate. (4)

8.6 State whether *K. pneumoniae* produces a positive or negative result for the following tests. In each case write only the question number and your answer. (6)

a. Motility

b. ODC

c. LDC

d. ADH

e. Urea

f. Indole

8.7 How is CLL classified according to the WHO? (1)

8.8 Explain why patients with CLL have increased risk of developing infections. (3)

8.9 Discuss the morphology characteristically observed on the peripheral blood smear of a patient with CLL. Include the morphology of abnormal white cells in your answer. (6)

QUESTION 9 [30]

A 20 year old female university student who lives in residence was admitted to the hospital's emergency ward with a high fever, vomiting and neck stiffness. Purpura was also seen on the skin. A CSF specimen was drawn and submitted for chemistry and microbiology examination. Macroscopically the CSF was turbid. Twenty four hours after admission blood was submitted to the haematology laboratory and the following results were obtained:

White cell count $17 \times 10^9/L$

Red cell count $3.4 \times 10^{12}/L$

Haemoglobin   10 g/dL

Haematocrit   0.325l/l

Platelet count $80 \times 10^9/L$

9.1 Describe what you would expect see microscopically in the CSF specimen. (3)

9.2 Explain how you would process the CSF specimen further (excluding microscopic procedures). (4)

9.3 After incubation the culture media plates have grey moist colonies which are oxidase positive.

Deduce the possible pathogen and propose how you would differentiate it from the other species in this genus. (3)

9.4 Predict the expected glucose and protein results of the CSF. Justify your answer. (4)

9.5 The clinician suspects the patient has renal failure. Propose the chemistry tests which would be most useful to confirm this. Give the expected results of each test. (8)

9.6 Comment on the full blood count results. (3)

9.7 What would you expect to see on the blood film of this sample? (2)

9.8 Create a haematological testing profile which can be used when DIC is suspected (excluding FBC). Give the expected results. (3)

END OF EXAMINATION