SMIMER, SURAT.
BIOCHEMISTRY DEPARTMENT
I[st] M. B. B. S. Batch 2016-2017 Preliminary Examination June 2017

Paper-II

Date: 17-06-2017 **Total Marks: 50** **Time: 2.5Hours**

Instructions:
1. Answers should be legible and to the point.
2. Use diagrams and flow-charts whenever necessary.
3. Figures to the extreme indicate full marks.

SECTION I:

1. Write short note (2 out of 3) **08**

a. Vitamin C: sources, absorption, metabolic functions, and deficiency manifestations.
b. Tryptophan metabolism: formation of nicotinic acid, serotonin, and melatonin
c. DNA replication.

2. Write in brief (4 out of 6) **12**

a. Absorption and storage of Vitamin B12.
b. Glutathione: chemistry and metabolic role.
c. Clotting factors
d. Enzyme inhibition: types with applications
e. Cytochrome p450: chemistry and role in detoxification.
f. Diagnostic application of enzymes.

3. Answer in few lines (5 out of 6) **05**

a. Glycine is optically active.
b. Features of denaturation of proteins.
c. Reference range for serum albumin and serum SGPT (ALT)
d. Which markers in serum are diagnostic of obstructive jaundice?
e. One example of functional plasma enzyme.
f. Mention four examples of air pollutants.

SECTION II:

4. Read the following case and answers the questions **10**

A 10 year-old-boy was brought to casualty with fever and breathlessness. Earlier he had been prescribed antibiotic for upper respiratory tract infection by a general practitioner. Presently the child appear out of breathe and was complaining of aches and pains, and tiredness. On examination, he was clinically anemic, icteric and show pallor and signs of retarded growth and development. His blood pressure was 98/68 mmHg and pulse was 100 beats per minute, with wide pulse pressure and hyperdynamic precordium. The sclera was yellow, abdomen was distended and the spleen was enlarged. Urine was analyzed by the staff-nurse in the side-lab; presence of abnormally large amounts of urobilinogen was reported.

The child was admitted for the treatment of respiratory tract infection and for further investigation. Emergency blood sample was sent to the biochemistry and hematology laboratory. A sputum sample was also analyzed. The antibiotic was changed when pneumococci were isolated from the sputum sample. The boy responded well to the new antibiotic and the fever rapidly subsided. However, most other symptoms persisted as before. Results of some of the blood tests are as here.

Test	Patient's report	Reference range
Hemoglobin	5.2 g/dl	13.0 – 16.0 g/dl
Red Blood Cells	2X 10^{12}/L	4.5 – 6.5 X 10^{12}/L
Platelets	190,000/µL	150,000 – 400,000/µL
Serum Bilirubin	4.8 mg/dl	0.1 – 1.0 mg/dl
Alanine transaminase	48 U/L	10 – 40 U/L
Alkaline Phosphatase	90 U/L	40 – 100 U/L
Lactate Dehydrogenase	386 U/L	100 – 300 U/L
Sodium	138 mmol/L	132 – 144 mmol/L
Potassium	5.5 mmol/L	3.6 – 5.0 mmol/L

The van den Bergh test showed elevated levels of water insoluble (unconjugated) bilirubin. Bilirubin was detected in the urine sample. However, the urine contained the large amounts of urobilinogen (urobillirubinuria) as stated earlier.

A fresh blood smear contained a few crescent-shaped cells. However, after 24-hour incubation in a sealed wet smear, nearly all the red cells assumed the shape of sickles. An increased reticulocyte count was also reported in this smear.

Electrophoresis of hemoglobin was performed to detect hemoglobin structural variant, if any. It revealed presence of HbS. Based on these tests, the child was diagnosed as having sickle cell anemia.

Peptide maps (or finger prints) of the trypsin digestion of the hemoglobin of this child were obtained and compared with that of a normal child of the same age group. The two were found to be remarkably different.

1. Explain features of molecular basis of sickle cell disease.
2. Comment on the quantitative blood picture, what are other biochemical features of this disorder?
3. State two other methods for detection of hemoglobin variants.
4. Why patients with sickle disease are naturally resistant to malaria?
5. What are other abnormal hemoglobin variants?

5. Write justification (5 out of 7) **10**

I. Vitamin D is considered as hormone.
II. HGPRT is important for normal function of brain.
III. Edema is observed in children with kwashiorkor but not with marasmus.
IV. Administration of dopamine is not effective in patients with Parkinson's disease.
V. Proline is not found in α-helix pattern.
VI. Blue fluorescent light is useful in the treatment of neonatal jaundice.
VII. Uracyl-N-Glycosylase is involved in DNA replication and DNA repair mechanism.

6. Answer in one or two lines (5 out of 6) **05**

I. Mention four causes of folate deficiency.
II. What is chloride shift?
III. What is microalbuminuria?
IV. Mention examples of second messenger.
V. Mention uses of Southern and Western blotting.
VI. Name any two newborn screening tests.