

M. SC. (BIOTECHNOLOGY) EXAMINATION, 2022

(1st Year, 2nd Semester)

SUBJECT : METABOLISM AND BIOENERGETICS

PAPER : MSBT 232

Time : Two hours

Full Marks : 50 (Written 40 + Internal Assessment 10)

Answer any four questions [4 x 10 =40]

Q1.(a) What is the benefit of having glycolysis in human while it is less efficient in producing the number of ATP molecules per glucose consumed?

(b) Compare the properties of enzymes hexokinase and glucokinase.

(c) Mention the possible fates of pyruvate.

(d) Where galactose is found? How galactose could be utilized in glycolysis?

(e) How glycolysis and gluconeogenesis are reciprocally controlled?

[2+2+2+(1+1)+2]

Q2.(a) Give a list of metabolites arising from Krebs' cycle and show which pathways they enter.

(b) What is the site of TCA Cycle in eukaryotes?

(c) Mention how different food sources can participate in TCA cycle.

(d) Mention the importance of Succinyl- CoA in biology.

[4+1+3+2]

Q3. (a) Where is the site of oxidative phosphorylation in eukaryotes? Prokaryotes?

(b) Give example of an uncoupling agent. What does it uncouple?

(c) What are the reactive oxygen species? How are they produced? What enzymes are involved in tackling ROS in human?

(d) What are the various shuttles that allow movement through the mitochondrial membrane?

[(1+1)+(1+1)+(1+1+1)+3]

Q4 (a) What are the differences between the photosystem I and Photosystem II?

(b) Why most of the microbial photosynthesis are an-oxygenic?

(c) Ribulose 1, 5-bisphosphate is the initial acceptor of the CO₂ molecule: Comment on the enzyme involved. Is the enzyme specific for CO₂ molecule?

(d) What are the differences between C₃ , C₄ , CAM plants?

(e) What is special about the archaea *Halobacterium salinarum*?

[2+2+(1+1)+3+1]

[Turn over

Q5 (a) Why Calvin cycle is also called the dark reaction? Can Calvin Cycle operate in non-photosynthetic organisms?

(b) what are two most important products of PPP?

(c) Glycogen metabolism is reciprocally controlled – explain in the light of the actions of epinephrine and insulin hormones.

(d) How many ATP could be generated from glucose if it is starting from glycogen?

[(!+1)+(1+1)+(2+2)+2]

Q6 (a) How could lipolysis contribute to gluconeogenic pathway?

(b) How many ATP could be generated from complete oxidation of palmitate?

(c) Mammals are unable to convert FA (Acetyl CoA) to glucose but plants (also bacteria) can. Explain.

(d) Give two examples of processes regulated by protein degradation

(f) Describe the role of pyridoxal phosphate in Transaminase reaction

[1+3+3+1+2]

Q7 (a) Briefly mention the role of activated molecule PRPP in nucleotide biosynthesis.

(b) Briefly comment on the Salvage pathway of purine biosynthesis.

(c) The Lesch-Nyhan syndrome, a genetic disease characterized by self-mutilation, mental deficiency and gout, is caused by which enzyme?

(d) Explain why Antifolates are often anticancer drugs.

(e) Briefly mention the committed step of cholesterol biosynthesis. Mention one inhibitor for this.

[2+2+1+2+(2+1)]