Question 1

Write the entire series of reactions that lead from glucose to aspartate in presence of glutamate

Question 2

E. Coli is able to synthesise all the amino acids. Some mutant bacteria nevertheless have defects in specific enzymes and are said *auxotroph* towards some specific amino acids (i.e., they cannot synthesise a given amino acid and need to take it up from the environment to grow). Consider three *E. Coli* auxotroph strains in glycine, glutamine and aspartate. Apart from proteins (that need all amino acids to be synthesised) what other compounds cannot be produced by each of these bacterial strains? Explain your answer

Question 3

What is the 14-C labelling of AMP in cells grown in the presence of uniformly 14-C labelled glycine? explain your answer.

Question 4

Obstructive gallbladder stones cause (among other things) jaundice and white stool. Can you explain this phenomenon?

Question 5

Gout is a common form of arthritis that occurs when urate crystals accumulate in your joint, causing the inflammation and intense pain of a gout attack.

1) A wrong diet can be a triggering cause of gout. Can you tell what substances should a food be rich in to be promoting gout.

2) allopurinol (an inhibitor of xanthine oxidase) is used to treat gout. Can you explain the biochemical bases of the treatment?

3) allopurinol treatment often causes the formation of kidney stones (crystals) but the incidence of kidney damage of this treatment is way less severe that that caused by gout. Can you explain this phenomenon (tip: the solubility of uric acid in urine is 0.15 g/L, that of xanthine is 0.05 g/L, that of hypoxanthine is 1.4 g/L)

Question 6

Methotrexate side effects include hair loss, diarrhea, low blood cell levels, increased risk of infection, liver damage.

Can you explain the common cause of these problems?