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22MBU310N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **MICROBIOLOGY**

MICROBIAL PHYSIOLOGY AND METABOLISM

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	--------- is both a micronutrient and a component of vitamin B12? (a) Cobalt (b) Magnesium (c) Nickel (d) Manganese	K1	CO2
	2	The phosphotransferase system (PTS) in bacteria is an example of _____. (a) facilitated diffusion (b) group translocation (c) secondary active transport (d) osmosis	K2	CO3
2	3	In *E. coli* diauxic growth, _____ is preferentially used. (a) galactose (b) lactose (c) maltose (d) glucose	K1	CO5
	4	One of the following is NOT a characteristic of bacterial endospores --------- (a) high heat resistance (b) high desiccation resistance (c) metabolically active state (d) presence of dipicolinic acid	K2	CO2
3	5	The pathway, which is common for both aerobic respiration and fermentation in bacteria is ---------- (a) Entner–Doudoroff pathway (b) Pentose phosphate pathway (c) Embden–Meyerhof pathway (d) Kreb's cycle	K1	CO4
	6	The chemical substrate used in bacterial bioluminescence is _____. (a) Riboflavin (b) $FMNH_2$ and long-chain aldehyde (c) NADPH (d) ATP only	K2	CO2
4	7	---------- is the immediate precursor for fatty acid synthesis in bacteria. (a) Malonyl-CoA (b) Acetyl-CoA (c) Pyruvate (d) Succinyl-CoA	K1	CO5
	8	The first purine nucleotide formed in the *de novo* pathway is _____. (a) AMP (b) GMP (c) IMP (d) XMP	K2	CO5
5	9	In bacterial anaerobic respiration, ---------- is NOT an electron acceptor. (a) Nitrate (NO_3^-) (b) Oxygen (O_2) (c) Carbon dioxide (CO_2) (d) Sulfate (SO_4^{2-})	K1	CO4
	10	A common application of propionic acid fermentation is in the production of _____. (a) Beer (b) Bread (c) Yogurt (d) Swiss cheese	K2	CO4

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Write and explain the different types of nutrition factors required for the growth of bacteria.	K1	CO1
		(OR)		
	11.b.	Describe bacterial membrane transport proteins with their functions.		
2	12.a.	Discuss in brief the four phases of bacterial growth, explaining the physiological changes in each.	K2	CO2
		(OR)		
	12.b.	Describe the stages of sporulation in bacteria.		
3	13.a.	Give an account on ED pathway.	K4	CO4
		(OR)		
	13.b.	Present the features of methanogens.		
4	14.a.	How does fatty acid biosynthesis differ from β-oxidation?	K4	CO4
		(OR)		
	14.b.	Explain with a neat diagram, the biosynthesis of amino acids belonging to the glutamate family.		
5	15.a.	Bring out the propionic acid fermentation. Add a note on its role in cheese production.	K4	CO4
		(OR)		
	15.b.	Define and mention two differences between lactic acid fermentation and alcoholic fermentation.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Describe facilitated diffusion and group translocation with characteristics and mechanisms.	K2	CO2
2	17	Define and explain continuous and synchronous culture.	K2	CO2
3	18	Give a detailed note on bacterial photosynthesis.	K4	CO4
4	19	Elaborate the biosynthesis of purines and pyrimidines.	K4	CO4
5	20	Explain the mechanism and significance of alcoholic fermentation with examples of fermenters and reactions.	K4	CO4

Z-Z-Z END