



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



III SEMESTER B.TECH (BIOTECHNOLOGY)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: INDUSTRIAL MICROBIOLOGY [BIO 2103]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.

1A.	Strain "A" has 5 similar and 6 dissimilar features as strain "B". Strain "C" has	2m
	2 similar and 4 unrelated features when compared to strain "B". Comparing	
	strains "A" and "C", similar features are 7 in number while 5 are unlike	
	features. Which two strains are most closely related?	
1B.	During the development of a vaccine, Jenner took pus taken from a cowpox	3m
	pustule and injected it into a boy's arm. Don't you think the boy would suffer	
	from cowpox? Whatever, his blood would now contain antibodies for cowpox.	
	How could then, these antibodies act as a vaccine against smallpox?	
10	Which algal pigment is water-soluble in nature? Classify them and state	5m
10.	which algal species contain them.	
2A.	"It may be possible for a phototrophic bacterium to grow as a chemotroph."	2m
	True / False. Justify.	
	State the temperature, pH and oxygen requirements of fungal organisms.	
2B.	Which growth medium is most used to grow fungi and what is special about	3m
	this medium?	
20	Describe the mechanism by which oxygen derivatives cause damage to	5m
20.	microbes. What are the protective mechanisms against such toxic forms?	
3A.	What structural features of xanthan provide it with a rigid rod configuration	3m
	and turn it into a highly efficient viscosifier of water?	

3B.	Enlist 3 differences between prokaryotes and eukaryotes, with respect to their genetic systems.	3m
3C.	Which is the original form of electron microscopy? What is the principal modification in the other?	4m
4A.	We have friendly <i>Candida</i> strains in our body. Under what circumstances does it lead to infection? And, why is it difficult to treat the infection with antibiotics?	5m
4B.	What do you understand by a plasmid? What purpose do they serve? What role does it play in microbial classification?	5m
5A.	Which type of spores has sterigmata in them? With a diagram, explain how these spores form and propagate.	4m
5B.	Why are microbial enzymes preferred over chemical catalysts in industrial operations? Enlist two such applications in detergent and cheese-processing industries.	6m

1A.	B5-ST1 A&B: $5 / 5+6 = 5/11 = 45.5\%$ B&C: $2 / 2+4 = 2/6 = 33.3\%$ A&C: $7 / 7+5 = 7/12 = 58.3\%$	2m
1B.	B3-ST1 Yes, the boy would suffer from mild symptoms of Cowpox+	3m
1C.	 B7-ST2 Biloproteins / Phycobilins: Water-soluble pigments; Pigment-protein complexes Present in only 2 algal divisions: Rhodophycophyta & Cryptophycophyta 2 kinds of phycobilins: Phycocyanin & Phycoerythrin. 	5m
2A.	B2-ST2TRUE. Rarely, a phototrophic bacterium can grow as a chemotroph.In the absence of O2 (i.e., under anaerobic conditions) R. rubrum uses light as its source of energy and lives as a photoorganotroph;In the presence of O2, it can grow in the dark as a chemoorganotroph	2m
2B.	B7-ST2 At temperatures from 20 to 30°C Acidic (pH 5.6) media that incorporates a relatively high conc. of sugar are tolerated by molds but are inhibitory to many bacteria. Almost all of them grow aerobically Sabouraud Media: Contains maltose and peptone as important components; Has Glucose; Selective action is due to the high sugar conc and low pH.	3m
2C.	 B3-ST2 Damage due to toxic derivatives of oxygen a. Addition of a single e- to an O₂ molecule, forming a superoxide radical: O₂•- b. Leads to production of more toxic H₂O₂ and hydroxyl radicals (OH•) 2 O₂•-+2 H+ → O₂ + H₂O₂ O₂•-+H₂O₂ → O₂ + OH - + OH• Protective mechanisms against the toxic forms of O₂ Aerobic and facultative organisms Superoxide dismutase eliminates superoxide radicals by increasing reaction rate of: 2 O₂•-+2 H+ → O₂ + H₂O₂ H₂O₂ produced, is dissipated by catalase and peroxidase: Catalase: 2 H₂O₂ → 2 H₂O + O₂ Peroxidase: H₂O₂ + reduced S → 2 H₂O + oxidized S (S: Substrate) 	5m
3A.	What structural features of xanthan provide it with a rigid rod configuration and turn it into a highly efficient viscosifier of water?	3m
3B.	B5-ST1	3m
3C.	Which is the original form of electron microscopy? What is the principal modification in the other?	4m
4A.	We have friendly <i>Candida</i> strains in our body. Under what circumstances does it lead to infection? And, why is it difficult to treat the infection with antibiotics?	5m

4B.	B7-ST1 Plasmids are extrachromosomal circular DNA. Provides new traits to the host. Role in classification.	5m
5A.	Basidiospores See slides	4m
5B.	Why are microbial enzymes preferred over chemical catalysts in industrial operations? Enlist two such applications in detergent and cheese-processing industries.	6m