Code.No: R05012305 | R05 | SET-1

I B.TECH – EXAMINATIONS, JUNE - 2011
PROCESS ENGINEERING PRINCIPLES
(BIOTECHNOLOGY)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Distinguish between the unit operations: Extraction and leaching.
b) What is the role of Engineer in bio process? [8+8]

2.a) What is the gravitational force constant [g_c] explain its significance with the F.P.S units and dimensions?
b) Define dyne and gram weight. How are they related? What are the dimensions and units of this conversion factor? [8+8]

3. Water is to be pumped from a storage tank through 7.5 cm dia pipe of 200 m long to an over head tank situated at a height of 20 m from the level of the pump using the additional data find the power required.
Data: Mass flow rate = 8.0 kg/sec
Frictional losses are = 0.15 J/kg per meter of pipe
Pump efficiency = 60%. [16]

4.a) Define absolute, reduced and apparent viscosity terms. State the units in CGS and SI systems.
b) Briefly write on the viscosity of a fermentation broth suspension.
c) Write on capillary viscometer for determining the viscosity. [5+3+8]

5.a) What is Mach number, subsonic and supersonic?
b) Derive equation for Mach number of an ideal gas in terms of its acoustic velocity. [8+8]

6. Derive Erguns equation for a fluid flowing through a packed bed. [16]

7. Write short note on:
a) Pitot tube
b) Variable area meter. [8+8]

8.a) Discuss in detail the construction and working of a centrifugal pump.
b) Explain the performance curve of a centrifugal pump. [8+8]

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Code.No: R05012305 | R05 | SET-2

I B.TECH – EXAMINATIONS, JUNE - 2011
PROCESS ENGINEERING PRINCIPLES
(BIOTECHNOLOGY)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1. Water is to be pumped from a storage tank through 7.5 cm dia pipe of 200 m long to an over head tank situated at a height of 20 m from the level of the pump using the additional data find the power required.
   Data: Mass flow rate = 8.0 kg/sec
   Frictional losses are = 0.15 J/kg per meter of pipe
   Pump efficiency = 60%. [16]

2.a) Define absolute, reduced and apparent viscosity terms. State the units in CGS and SI systems.
   b) Briefly write on the viscosity of a fermentation broth suspension.
   c) Write on capillary viscometer for determining the viscosity. [5+3+8]

3.a) What is Mach number, subsonic and supersonic?
   b) Derive equation for Mach number of an ideal gas in terms of its acoustic velocity. [8+8]

4. Derive Erguns equation for a fluid flowing through a packed bed. [16]

5. Write short note on:
   a) Pitot tube
   b) Variable area meter. [8+8]

6.a) Discuss in detail the construction and working of a centrifugal pump.
   b) Explain the performance curve of a centrifugal pump. [8+8]

7.a) Distinguish between the unit operations: Extraction and leaching.
   b) What is the role of Engineer in bio process? [8+8]

8.a) What is the gravitational force constant [g_c] explain its significance with the F.P.S units and dimensions?
   b) Define dyne and gram weight. How are they related? What are the dimensions and units of this conversion factor? [8+8]

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Code.No: R05012305 | R05 | SET-3

I B.TECH – EXAMINATIONS, JUNE - 2011
PROCESS ENGINEERING PRINCIPLES
(BIOTECHNOLOGY)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) What is Mach number, subsonic and supersonic?
b) Derive equation for Mach number of an ideal gas in terms of its acoustic velocity. [8+8]

2. Derive Erguns equation for a fluid flowing through a packed bed. [16]

3. Write short note on:
a) Pitot tube
b) Variable area meter. [8+8]

4.a) Discuss in detail the construction and working of a centrifugal pump.
b) Explain the performance curve of a centrifugal pump. [8+8]

5.a) Distinguish between the unit operations: Extraction and leaching.
b) What is the role of Engineer in bio process? [8+8]

6.a) What is the gravitational force constant [g_c] explain its significance with the F.P.S units and dimensions?
b) Define dyne and gram weight. How are they related? What are the dimensions and units of this conversion factor? [8+8]

7. Water is to be pumped from a storage tank through 7.5 cm dia pipe of 200 m long to an over head tank situated at a height of 20 m from the level of the pump using the additional data find the power required.
Data: Mass flow rate = 8.0 kg/sec
Frictional losses are = 0.15 J/kg per meter of pipe
Pump efficiency = 60%. [16]

8.a) Define absolute, reduced and apparent viscosity terms. State the units in CGS and SI systems.
b) Briefly write on the viscosity of a fermentation broth suspension.
c) Write on capillary viscometer for determining the viscosity. [5+3+8]

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Code.No: R05012305 | R05 | SET-4

I B.TECH – EXAMINATIONS, JUNE - 2011
PROCESS ENGINEERING PRINCIPLES
(BIOTECHNOLOGY)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1. Write short note on:
   a) Pitot tube
   b) Variable area meter. [8+8]

2.a) Discuss in detail the construction and working of a centrifugal pump.
   b) Explain the performance curve of a centrifugal pump. [8+8]

3.a) Distinguish between the unit operations: Extraction and leaching.
   b) What is the role of Engineer in bio process? [8+8]

4.a) What is the gravitational force constant [g_c] explain its significance with the F.P.S units and dimensions?
   b) Define dyne and gram weight. How are they related? What are the dimensions and units of this conversion factor? [8+8]

5. Water is to be pumped from a storage tank through 7.5 cm dia pipe of 200 m long to an over head tank situated at a height of 20 m from the level of the pump using the additional data find the power required.
   Data: Mass flow rate = 8.0 kg/sec
   Frictional losses are = 0.15 J/kg per meter of pipe
   Pump efficiency = 60%. [16]

6.a) Define absolute, reduced and apparent viscosity terms. State the units in CGS and SI systems.
   b) Briefly write on the viscosity of a fermentation broth suspension.
   c) Write on capillary viscometer for determining the viscosity. [5+3+8]

7.a) What is Mach number, subsonic and supersonic?
   b) Derive equation for Mach number of an ideal gas in terms of its acoustic velocity. [8+8]

8. Derive Erguns equation for a fluid flowing through a packed bed. [16]

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