

B.TECH. DEGREE EXAMINATION, MAY 2018**Fourth Semester**

Branch : Mechanical Engineering / Production Engineering

ME 010 403/PE 010 403—HYDRAULIC MACHINES (ME, PE)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 3 marks.*

1. Briefly explain the propulsion of ships.
2. Write down Euler's turbine equation and give examples for impulse and reaction turbines.
3. What is mean by NPSH and how it relate with cavitation ?
4. Comment on Reynold's number, Froude number, Euler's number, Weber's number and Mach number.
5. What is mean by 'slip' ? How it affects the efficiency ?

(5 × 3 = 15 marks)

Part B*Answer all questions.**Each question carries 5 marks.*

6. Derive an expression for work done by a fluid jet on a moving curved vane.
7. Differentiate the working principle of an impulse turbine and reaction turbine.
8. Draw the operating characteristic curves of a centrifugal pump and write down the criteria for selecting the pumps.
9. Write down the steps involved in Rayleigh method and Buckingham's π theorem method.
10. Explain the working of a jet pump.

(5 × 5 = 25 marks)

Turn over

Part C*Answer all questions.**Each full question carries 12 marks.*

11. A jet of water moving at 20 m/s impinges on a symmetrical curved vane shaped to deflect the jet through 120° (that is the vane angle θ and ϕ are each equal to 30°). If the vane is moving at 5 m/s. find the angle of the jet so that there is no shock at inlet. Also determine the absolute velocity of exit in magnitude and direction and work done.

Or

12. A 50 mm. diameter jet having a velocity of 25 m/s strikes a flat plate, normal of which is inclined at 30° to the axis of jet. Calculate the normal force exerted on the plate, if

- (a) When the plate is stationary.
 (b) Plate is moving with a velocity of 5 m/s in the direction of jet.
 (c) Find also work done and efficiency of jet on both above mentioned cases.

13. A pelton turbine has to be designed for the following data :

Power developed = 6 MW

Net load available = 500 m

Speed = 100 r.p.m.

Ratio of jet diameter to wheel diameter = $1/10$ and overall efficiency is 90 %.

- (a) Find the number of jets ; (b) Diameter of the jet ; (c) Diameter of the wheel ; (d) Quantity of water required.

Or

14. Explain with neat figure any one method for regulating speed of a turbine.

15. Find the power required to drive a monoblock centrifugal pump which delivers 20 l/s of water to a height of 8 m. through a 40 mm. diameter and 100 m. long pipe. The overall efficiency of pump is 85 % and Darcy's $f = 0.66$ for pipelines. Assume inlet losses in suction pipe equal to 0.15 m.

Or

16. Explain various losses and efficiencies in a centrifugal pump and also the selection criteria for impellers.

17. Assuming that the rate of discharge Q of a centrifugal pump is dependent upon the mass density ' ρ ' of the fluid; Pump speed ' N ' (rpm) the diameter of impeller ' D ' the pressure drop ΔP and viscosity of the fluid μ . Show that by Buckingham's π theorem method

$$Q = (ND^3) \phi \left[\left(\frac{gH}{N^2 D^2} \right), \left(\frac{\nu}{ND^2} \right) \right]$$

Where H - head ν - Kinematic viscosity of the fluid.*Or*

18. What is mean by Thomas Cavitation Factor ? Explain cavitation in pumps and turbines.
19. (a) Explain Indicator diagram in reciprocating pumps. (6 marks)
- (b) A double acting reciprocating pump having piston area 0.1 m^2 has a stroke 0.30 m . long. The pump is discharging 2.4 m^3 of water per minute at 45 r.p.m. through a height of 10 m . Find the slip of the pump and the power required to drive the pump. (6 marks)

Or

20. (a) Explain the working of a compressor pump, slurry pump, gear pump and vane pump. (6 marks)
- (b) Explain the working of a hydraulic accumulator, hydraulic lift and fluid coupling. (6 marks)

[5 × 12 = 60 marks]

B.TECH. DEGREE EXAMINATION, MAY 2018**Fourth Semester**

Branch : Mechanical Engineering/Automobile Engineering

AU 010 404/ME 010 404—MANUFACTURING PROCESS [AU, ME]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 3 marks.*

1. What is core ? What is its use in casting ?
2. Explain the basic principles of arc welding process.
3. What is angle of bite in rolling ? On what factors does its value depend ?
4. What is forging under sticking condition ?
5. Explain 3-2-1 locating principle used for designing jigs and fixtures.

(5 × 3 = 15 marks)

Part B*Answer all questions.**Each question carries 5 marks.*

6. Discuss the various properties of moulding sand.
7. Write on different types of electrodes used in arc welding.
8. Compare hot and cold rolling process.
9. Explain different types of defects in forging process.
10. Describe the difference between progressive, compound, combination dies.

(5 × 5 = 25 marks)

Part C*Answer all questions.**Each full question carries 12 marks.*

11. Explain the following casting processes :
 - (a) Investment casting.
 - (b) Slush casting.

Or

Turn over

12. With the help of a diagram, explain the working of a "Cupola".
13. With the help of neat sketches, explain the following welding process. List its advantages, disadvantages and applications :
- (a) TIG welding.
 - (b) GMA welding.
 - (c) Flux cored arc welding.

Or

14. Explain defects in welding process. Give the reasons and suggest the remedies.
15. Explain rolling mills and their classifications with the help of neat sketch.

Or

16. What is shape rolling ? With sketches explain the steps involved in production of H-section.
17. What are the various types of forging methods available to a manufacturing engineer ? Explain with figure and applications.

Or

18. (a) Distinguish between Wire drawing and Tube drawing with sketches.
(b) What is forgeability ? Explain any one forgeability test.
19. (a) What are the methods of bending ?
(b) What is spring back ? What are the methods to avoid this in bending process ?

Or

20. Explain deep drawing process with neat sketch. Calculate the punch force required for deep drawing.

(5 × 12 = 60 marks)