

PART-A

(5 x 2 = 10 Marks)

Note: (i) Answer any FIVE questions out of which question No.8 is compulsory.
(ii) All questions carry equal marks.

- 1 Define Limiting Friction.
- 2 Define Cyclic Loading.
- 3 What is meant by Composite bar?
- 4 Distinguish between Centroid and Centre of gravity.
- 5 Define neutral axis.
- 6 What is meant by flexural strength of a beam?
- 7 Write the torsion equation.
- 8 What are the characteristics of a force?

PART-B

(5 x 3 = 15 Marks)

Note: (i) Answer any FIVE questions out of which question No. 16 is compulsory.
(ii) All questions carry equal marks.

- 9 What are the types of friction? Explain.
- 10 Draw stress-strain diagram of a mild steel specimen subjected to tensile loading and indicate its salient points.
- 11 Calculate the strain energy that can be stored in a steel bar 40 mm in diameter and 3m long subjected to a pull of 100 kN. Take $E=200 \text{ kN/mm}^2$
- 12 Define polar moment of inertia. Write the expression for polar moment of inertia of circular section.
- 13 Write the relationship between load, shear force and bending moment.
- 14 Calculate the power transmitted by a shaft of diameter 150 mm at 120 rpm, if the maximum shear stress is not to exceed 80 N/mm^2 .
- 15 What are the advantages of hollow shaft over solid shaft?
- 16 Explain different types of supports in a beam.

PART-C

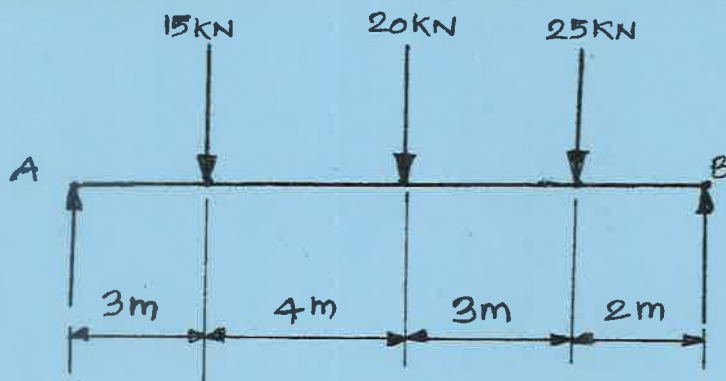
(5 x 10 = 50 Marks)

Note: (i) Answer all the questions choosing either sub-division (A) or sub-division (B) of each question
(ii) All questions carry equal marks.

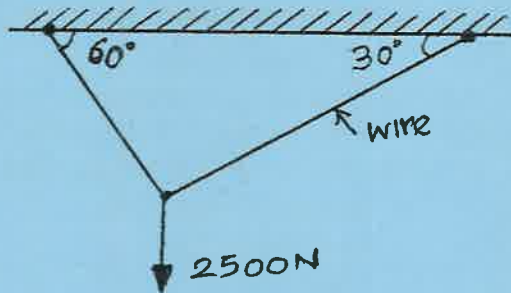
- 17 A The following pulling forces act at a point: 10
- i) 25N towards North ii) 10N North-East iii) 15N towards East
iv) 20N 30° East of south v) 30N 60° south of west
Find the magnitude and direction of resultant.

(OR)

- B i) Determine the support reactions of the beam shown in figure. 5



- ii) A Load of 2500 N is suspended by two wires as shown in figure. Determine the tension in the wires. 5



- 18 A A steel bar of 500 mm length, 60 mm width and 20 mm thickness is subjected to an axial compression of 168 kN. Calculate the final dimensions and volume of the bar. The modulus of elasticity of steel is $2.1 \times 10^5 \text{ N/mm}^2$, and the Poisson's ratio of the steel is 0.3. 10
- (OR)
- B A copper rod of 25 mm diameter is surrounded tightly by a cast iron tube 60 mm external diameter, their ends being firmly fastened together. When they are subjected to a compressive load of 15 kN axially, what load is taken by each member? Also, determine the contraction of the bar if their length is 100 mm originally. The Young's modulus of copper is $0.1 \times 10^6 \text{ N/mm}^2$ and that of cast iron is $0.12 \times 10^6 \text{ N/mm}^2$. 10
- 19 A An unequal angle section is 100 mm wide and 120 mm deep overall and both flanges of the angle section are 10 mm thick. Find I_{xx} , I_{yy} , K_{xx} and K_{yy} . 10
- (OR)
- B i) A long steel tube 70 mm internal diameter and wall thickness 2.5 mm has closed ends and subjected to an internal pressure of 10 N/mm^2 . Calculate the magnitude of hoop stress and longitudinal stress set up in the tube. 5
- ii) Distinguish between thick cylinder and thin cylinder. 5
- 20 A A simply supported beam of span 10 m carries an UDL of 25 kN/m over the left half of the span and a point load of 25 kN at the mid span. Draw the SFD and BMD. Find also the position and magnitude of maximum bending moment. 10
- (OR)
- B Derive the flexural formula: $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$ 10
- 21 A A shaft running at 200 rpm has to transmit 125 kW. The shaft should not be stressed beyond 65 N/mm^2 and should not twist more than 1.5° in a length of 5 m, select a suitable diameter. Take modulus of rigidity as $0.8 \times 10^5 \text{ N/mm}^2$. 10
- (OR)
- B Design a closely coiled helical spring of stiffness 25 N/mm deflection. The maximum shear stress in the spring material is not to exceed 80 N/mm^2 under a load of 600 N. The diameter of the coil is to be 10 times the diameter of the wire. Take rigidity modulus, $C = 85 \times 10^3 \text{ N/mm}^2$. 10

**Code: 150-2202, 110-2202 &
150-4202**

MECH & PRODN

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM

(Autonomous)

Reg. No.

**October/November 2019 Examinations
DIPLOMA IN MECHANICAL ENGINEERING &
DIPLOMA IN PRODUCTION ENGINEERING
Manufacturing Processes**

Year/Sem: II / III (ODD-II)

Max. Marks : 75

Time : 3 hr.

PART-A

(5 x 2 = 10 Marks)

Note: (i) Answer any FIVE questions out of which question No.8 is compulsory.

(ii) All questions carry equal marks.

- 1 What are the different types of pattern allowances given on the pattern?
- 2 What is the purpose of using core in sand moulding?
- 3 What is the purpose of using flux during welding?
- 4 Define cold working.
- 5 Mention the types of chip formation.
- 6 What is the purpose of using cutting fluid?
- 7 List the methods of holding drill bits.
- 8 What are the advantages of gas welding?

PART-B

(5 x 3 = 15 Marks)

Note: (i) Answer any FIVE questions out of which question No. 16 is compulsory.

(ii) All questions carry equal marks.

- 9 Define pattern and list the pattern materials.
- 10 List the various defects that occur in castings.
- 11 Compare arc welding and gas welding.
- 12 What is piercing and trimming?
- 13 Write the mechanical properties of parts made by powder metallurgy.
- 14 What is follower rest?
- 15 Draw and label the parts of Vernier caliper.
- 16 What is the use of sine bar?

PART-C

(5 x 10 = 50 Marks)

Note: (i) Answer all the questions choosing either sub-division (A) or sub-division (B) of each question.

(ii) All questions carry equal marks.

- 17 A Explain the step by step procedure for making a green sand mould. 10
(OR)
B Explain cold chamber process of die casting with a neat sketch. 10
- 18 A Explain Laser beam welding with neat sketch. 10
(OR)
B Explain magnetic particle test and ultrasonic test in welding. 10
- 19 A Enumerate the stages how a component is produced in upset forging. 10
(OR)
B Explain manufacturing of metal powders by atomization and electrolysis deposition. 10
- 20 A What are the work holding devices used in a lathe? Explain any two. 10
(OR)
B Explain Geneva indexing mechanism with a neat sketch. 10
- 21 A Explain the construction of radial type drilling machine with neat sketch. 10
(OR)
B (i) Explain the working principle of pneumatic comparator with sketch. 5
(ii) Explain the working principle of autocollimator with sketch. 5

Code: 150-2203 &
150-4203

MECH & PRODN

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM
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Reg. No.

October/November 2019 Examinations
DIPLOMA IN MECHANICAL ENGINEERING &
DIPLOMA IN PRODUCTION ENGINEERING
Fluid Mechanics and Fluid Power

Year/Sem: II / III (ODD-II)

Max. Marks : 75

Time : 3 hr.

PART-A

(5 x 2 = 10 Marks)

Note: (i) Answer any FIVE questions out of which question No.8 is compulsory.
(ii) All questions carry equal marks.

- 1 How fluids are classified?
- 2 State Pascal's law.
- 3 What are the different energies of fluid?
- 4 Define Hydraulic mean radius.
- 5 What is meant by Impact of jet?
- 6 Define head race and tail race.
- 7 Draw ISO symbol for 3/2 DCV
- 8 State demerits of hydraulic system.

PART-B

(5 x 3 = 15 Marks)

Note: (i) Answer any FIVE questions out of which question No. 16 is compulsory.
(ii) All questions carry equal marks.

- 9 Define surface tension, viscosity and specific gravity.
- 10 What are the minor losses of flowing fluid?
- 11 What are the types of draft tube?
- 12 Define Cavitation and Priming.
- 13 Draw block diagram of pneumatic system.
- 14 Explain lubricator.
- 15 List the service properties of hydraulic fluid.
- 16 Differentiate hydraulic and pneumatic systems.

PART-C

(5 x 10 = 50 Marks)

Note: (i) Answer all the questions choosing either sub-division (A) or sub-division of each question.
(ii) All questions carry equal marks.

- 17 A Explain construction and working of Dead weight pressure gauge with neat sketch. 10
(OR)
B A differential manometer is connected at two points A and B in a horizontal pipe line containing an oil of specific gravity 0.8 and the difference in mercury level is 125 mm. Determine the difference in pressures at the two points in terms of head of water in meters and kN/m^2 10
- 18 A State Bernoulli's theorem and list the assumptions made, its limitations & Applications. 10
(OR)
B A pipe line 10 km long delivers a power of 50 kw at its outlet end, The pressure is 4500 kN/m^2 at inlet and pressure drop per km of pipe is 50 kN/m^2 . Assuming $F = 0.025$, determine the diameter of pipe and the efficiency of transmission. 10
- 19 A Describe construction and working of Single stage centrifugal pump with neat sketch. 10
(OR)
B Explain construction and working of Francis turbine with neat sketch. 10
- 20 A Explain single cycle automatic operation double acting cylinder with neat sketch. 10
(OR)
B Describe operation of double acting cylinder with metering in control with neat sketch. 10
- 21 A Describe construction and working of Internal gear pump and Pressure relief valve with neat sketch. 10
(OR)
B Explain hydraulic circuit for milling machine table movement with neat sketch. 10
