

**Code: 150-2201 & 110-2201
150-4201**

MECH & PRODN

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM

(Autonomous)

Reg. No.

October/November 2018 Examinations

DIPLOMA IN MECHANICAL ENGINEERING

&

DIPLOMA IN PRODUCTION ENGINEERING

Strength of Materials

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 State parallelogram law of forces.
- 2 State Varignon's theorem.
- 3 Define Hooke's law.
- 4 What do you mean by proof resilience?
- 5 Define centroid.
- 6 List any four types of beam.
- 7 What do you mean by spring constant?
- 8 What do you mean by moment of resistance?

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 List the three necessary conditions for equilibrium of rigid bodies in two dimensions.
- 10 Define the following mechanical properties: Stiffness, Toughness and Strength.
- 11 Draw the stress-strain diagram for steel and indicates the major point.
- 12 Compare thin and thick cylindrical shell on any three aspects.
- 13 A gas cylinder of internal diameter 1.5 m is 30 mm thick. Find the allowable pressure of the gas inside the cylinder if the permissible tensile stress is not to exceed 150 N/mm^2 .
- 14 List the assumptions made in the theory of simple bending.
- 15 Compare closely coiled helical spring and open coiled helical spring.
- 16 State the laws of static friction.

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 divisions carry equal marks.

- 17 A Three like parallel forces 100 N, 200 N and 300 N are acting perpendicularly at points A, B and C respectively on a straight line ABC. The distances are $AB = 3 \text{ m}$ and $BC = 4 \text{ m}$. Find the resultant and also the distance of the resultant from point A on the line ABC. 10
- (OR)
- B A body weighing 2000 N is suspended with a chain AB of 2 m long. It is pulled by a horizontal force of 320 N. Find the force in the chain and the lateral displacement of the body. 10
- 18 A A steel tube 100 mm internal diameter and 12.5 mm thick is surrounded by a brass tube of the same thickness in such a way that the axes of the two tubes coincide. The compound tube is loaded by an axial compressive load of 5 kN. Determine the load carried by each tube and also the stresses and strain developed in each tube. Assume that there is no buckling of the tubes. Take Young's Modulus for steel as $2 \times 10^5 \text{ N/mm}^2$ and that for brass as $1 \times 10^5 \text{ N/mm}^2$. The tubes are of the same length. 10

(OR)

- B A steel bar of 30 mm diameter and length of 1 m is subjected to a pull of 25 kN. If $E = 2 \times 10^5 \text{ N/mm}^2$, find the elongation of the bar and change in diameter. If $\nu = 0.3$, determine the change in volume of the bar. 10
- 19 A Find the values of I_{xx} and I_{yy} of a T-section of 120 mm wide and 120 mm deep overall. Both the web and flange are 10 mm thick. 10
- (OR)**
- B i) Determine the centroid of an angle section 100 mm \times 80 mm \times 20 mm thick with its longer arm being placed vertical. 5
- ii) A spherical vessel of 3 m diameter is subjected to an internal pressure of 1.5 N/mm^2 . Find the thickness of the plate, if the maximum stress is not to exceed 90 N/mm^2 . The efficiency of the joint is 75% 5
- 20 A A beam is freely supported over a span of 8 m. It carries a point load of 8 kN at 2 m from the left hand support and a UDL of 2 kN/m run from the centre upto the right hand support. Construct the SFD and BMD. 10
- (OR)**
- B A test beam of square section 25 mm \times 25 mm is broken by a transverse load of 750 N applied at the centre of the span 1 m. Using the factor of safety of 4. Calculate the safe UDL for a beam of 120 mm width and 300 mm depth-freely supported over a span of 5 m. 10
- 21 A A solid steel shaft of 60 mm diameter is to be replaced by a hollow steel shaft of the same material with internal diameter equal to half of the external diameter. Find the diameters of the hollow shaft and saving in material, if the maximum allowable shear stress is same for both the shafts. 10
- (OR)**
- B Design a closely coiled helical spring of stiffness 20 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 $N = 85 \times 10^3 \text{ N/mm}^2$. 10

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM

(Autonomous)

Reg. No.

October/November 2018 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 Define pattern.
- 2 What do you understand about the term plasma?
- 3 What is sizing in powder metallurgy?
- 4 Define cutting speed.
- 5 What do you mean by deep hole drilling?
- 6 List any two types of pattern allowances.
- 7 List any two advantages of optical comparator.
- 8 List any two differences between precision and accuracy.

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 Explain the gating system with sketch.
- 10 List any three welding defects, their causes and its remedies.
- 11 List any three advantages of press forging.
- 12 How do you specify a centre lathe?
- 13 Compare electrical and mechanical comparator on any three aspects.
- 14 Explain CO₂ process of core making.
- 15 Explain any two types of welded joint.
- 16 Sketch and indicate the parts of a vernier height gauge along with its applications.

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 divisions carry equal marks.

- 17 A Explain the construction of cupola furnace and label its main parts. Also explain the operation of cupola furnace. 10
(OR)
B i) Explain any one of mould preparation machine with neat sketches. 5
ii) Compare hot chamber die casting and cold chamber die casting. 5
- 18 A Explain the following: 10
i) Spot welding ii) Seam welding iii) Butt welding.
(OR)
B i) Explain the arrangements of electro-slag welding and indicate its salient parts and its principle of operation. 5
ii) Explain the Radiographic test with neat sketch. 5
- 19 A Explain the different methods of manufacturing metal powders in powder metallurgy. 10
(OR)
B i) Explain smith forging and roll forging operations with neat sketches. 5
ii) Explain about notching and lancing operations. 5
- 20 A i) Explain the formation of three types of chip in metal cutting. 5
ii) Explain any two work holding devices used in semi-automatic lathes. 5
(OR)
B Explain tumbler geared mechanism in a lathe with simple line sketch. 10
- 21 A Explain the nomenclature of a twist drill with neat sketch. 10
(OR)
B i) Explain the working principle of Auto collimator with neat sketch. 5
ii) Explain the principle of operation of pneumatic comparator. 5

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM
(Autonomous)

Reg. No.

October/November 2018 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 What is meant by pressure head?
- 2 What is meant by stream line flow?
- 3 Write down the formula to find the theoretical discharge of a double acting reciprocating pump.
- 4 What are the different types of impellers used in centrifugal pump?
- 5 Draw the ISO symbol of FRL unit.
- 6 What is pressure intensifier?
- 7 List out the minor energy losses.
- 8 State any two demerits of hydraulic systems.

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 State Pascal's law and give its examples.
- 10 Write the applications of orifice.
- 11 Differentiate impulse and reaction turbines.
- 12 Explain quick exhaust valve.
- 13 What is 3/2 DCV? Draw its ISO symbol.
- 14 State Bernoulli's theorem and write its few applications.
- 15 Write any six properties of fluid.
- 16 Compare 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 (B) of each question. (ii) All divisions carry equal marks.

- 17 A i) A gauge fitted to a compressor shows a reading of 30 kN/m². Compute the corresponding absolute pressure in kN/m² and 'm' of water. 5
ii) Explain the working of hydraulic jack with a neat sketch. 5
(OR)
B i) Explain the working of Bourdon's tube pressure gauge with simple sketch. 5
ii) Explain the procedure followed to measure the difference of pressure between two pipe line liquids by using U- tube differential manometer. 5
- 18 A i) What are the hydraulic co-efficients? Explain briefly. 5
ii) Using chezy's formula determine the head lost due to friction in a pipe of 80mm diameter and 35m length. The velocity of flow is 2m/s and C = 100. 5
(OR)
B i) Compare Venturimeter and Orificemeter. 5
ii) Two reservoirs are connected by a pipe line of length 500m. The difference in level between the reservoirs is 10m. If the maximum discharge is 0.2m³/s, calculate the required size of the pipe. Assume f = 0.005. 5
- 19 A A jet of water 80mm diameter moves with a velocity of 15m/s and strikes a series of vanes moving with a velocity of 10m/s. Find (a) the force exerted by the jet, (b) work done by the jet per second, (c) efficiency of the jet and (d) vane velocity for maximum efficiency. 10
(OR)
B Explain the construction and working principle of Jet pump with neat sketch. 10
- 20 A Explain with circuit diagram the operation of double acting cylinder with metering-out control. 10
(OR)
B Draw a pneumatic circuit diagram for the direct control of single acting cylinder and explain. 10
- 21 A i) Explain the spring loaded type accumulator with a sketch. 5
ii) Explain radial piston pump with a sketch. 5
(OR)
B Explain the hydraulic circuit with ISO symbols for the table movement of surface grinding machine. 10