

Mechanical Engineering Sample Papers

1 During the execution of a CNC part program block NO20 GO2 X45.0 Y25.0 R5.0 the type of tool motion will be

- A) circular Interpolation — clockwise
- B) circular Interpolation — counterclockwise
- C) linear Interpolation
- D) rapid feed

Answer : (A)

2 A component can be produced by any of the four processes I, II, III and IV. Process I has a fixed cost of Rs. 20 and variable cost of Rs. 3 per piece. Process II has a fixed cost Rs. 50 and variable cost of Re. 1 per piece. Process III has a fixed cost of Rs. 40 and variable cost of Rs. 2 per piece. Process IV has a fixed cost of Rs. 10 and variable cost of Rs. 4 per piece. If the company wishes to produce 100 pieces of the component, from economic point of view it should choose

- A) Process I
- B) Process II
- C) Process III
- D) Process IV

Answer : (B)

3 In an interchangeable assembly, shafts of size 25.000 ± 0.040 mm mate with holes of size 25.000 ± 0.020 mm. The maximum possible clearance in the assembly will be

- A) 10 microns
- B) 20 microns
- C) 30 microns
- D) 60 microns

Answer : (D)

4 A company has two factories S1, S2 and two warehouses D1, D2. The supplies from S1 and S2 are 50 and 40 units respectively. Warehouse D1 requires a minimum of 20 units and a maximum of 40 units. Warehouse D2 requires a minimum of 20 units and, over and above, it can take as much as can be supplied. A balanced transportation problem is to be formulated for the above situation. The number of supply points, the number of demand points, and the total supply (or total demand) in the balanced transportation problem respectively are

- A) 2, 4, 90
- B) 2, 4, 110
- C) 3, 4, 90
- D) 3, 4, 110

Answer : (C)

5 An incompressible fluid (kinematic viscosity, 7.4×10^{-7} m²/s, specific gravity, 0.88) is held between two parallel plates. If the top plate is moved with a velocity of 0.5 m/s while the bottom one is held stationary, the fluid attains a linear velocity profile

in the gap of 0.5 mm between these plates; the shear stress in Pascals on the surface of top plate is

- A) 0.651×10^{-3}
- B) 0.651
- C) 6.51
- D) 0.651×10^3

Answer : (B)

6 The tool of an NC machine has to move along a circular arc from (5,5) to (10,10) while performing an operation. The centre of the arc is at (10,5). Which one of the following NC tool path commands performs the above mentioned operation?

- A) N010 G02 X10 Y10 X5 Y5 R5
- B) N010 G03 X10 Y10 X5 Y5 R5
- C) N010 G01 X5 Y5 X10 Y10 R5
- D) N010 G02 X5 Y5 X10 Y10 R5

Answer : (D)

7 During a Morse test on a 4 cylinder engine, the following measurements of brake power were taken at constant speed.

All cylinders firing 3037 kW

Number 1 cylinder not firing 2102 kW

Number 2 cylinder not firing 2102 kW

Number 3 cylinder not firing 2100 kW

Number 4 cylinder not firing 2098 kW

The mechanical efficiency of the engine is

- A) 91.53%
- B) 85.07%
- C) 81.07%
- D) 61.22%

Answer : (C)

8 In terms of theoretical stress concentration factor (K_t) and fatigue stress concentration factor (K_f), the notch sensitivity 'q' is expressed as

- A) $(K_f - 1) (K_t - 1)$
- B) $(K_f - 1) (K_t + 1)$
- C) $(K_t - 1) (K_f - 1)$
- D) $(K_f + 1) (K_t + 1)$

Answer : (A)

9 Starting from $x_0 = 1$, one step of Newton-Raphson method in solving the equation $x^3 + 3x - 7 = 0$ gives the next value (x_1) as

- A) $x_1 = 0.5$
- B) $x_1 = 1.406$
- C) $x_1 = 1.5$
- D) $x_1 = 2$

Answer : (C)

10 The S-N curve for steel becomes asymptotic nearly at

- A) 10^3 cycles
- B) 10^4 cycles
- C) 10^6 cycles
- D) 10^9 cycles

Answer : (C)