

Mechanical Engineering Sample Papers

1 In PERT analysis a critical activity has

- A) maximum Float
- B) zero Float
- C) maximum Cost
- D) minimum Cost

Answer : (B)

2 Environment friendly refrigerant R134a is used in the new generation domestic refrigerators. Its chemical formula is

- A) CH C1 F2
- B) C2 C13 F3
- C) C2 C12 F4
- D) C2 H2 F4

Answer : (D)

3 A solid cylinder (surface 2) is located at the centre of a hollow sphere (surface 1). The diameter of the sphere is 1m, while the cylinder has a diameter and length of 0.5 m each. The radiation configuration factor F11 is

- A) 0.375
- B) 0.625
- C) 0.75
- D) 1

Answer : (C)

4 For a fluid flow through a divergent pipe of length L having inlet and outlet radii of R1 and R2 respectively and a constant flow rate of Q, assuming the velocity to be axial and uniform at any cross-section, the acceleration at the exit is

- A) $2Q(R_1 - R_2) / \rho L R_2^3$
- B) $2Q^2 (R_1 - R_2) / \rho L R_2^3$
- C) $2Q^2 (R_1 - R_2) / \rho^2 L R_2^5$
- D) $2Q^2 (R_2 - R_1) / \rho^2 L R_2^5$

Answer : (C)

5 An incompressible fluid (kinematic viscosity, $7.4 \times 10^{-7} \text{ m}^2/\text{s}$, 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 A maintenance service facility has Poisson arrival rates, negative exponential service time and operates on a 'first come first served' queue discipline. Break downs occur on an average of 3 per day with a range of zero to eight. The maintenance crew can service an average of 6 machines per day with a range of zero to seven. The mean waiting time for an item to be serviced would be

- A) 16 day
- B) 13 day

- C) 1 day
- D) 3 days

Answer : (A)

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

- A) 103 cycles
- B) 104 cycles
- C) 106 cycles
- D) 109 cycles

Answer : (C)

12 In a rolling process, sheet of 25 mm thickness is rolled to 20 mm thickness. Roll is of diameter 600 mm and it rotates at 100 rpm. The roll strip contact length will be

- A) 5 mm
- B) 39 mm
- C) 78mm
- D) 120mm

Answer : (A)

13 Water at 42°C is sprayed into a stream of air at atmospheric pressure, dry bulb temperature of 40°C and a wet bulb temperature of 20°C. The air leaving the spray humidifier is not saturated. Which of the following statements is true?

- A) Air gets cooled and humidified
- B) Air gets heated and humidified
- C) Air gets heated and dehumidified
- D) Air gets cooled and dehumidified

Answer : (B)

14 The angle between two unit-magnitude coplanar vectors $P(0.866, 0.500, 0)$ and $Q(0.259, 0.966, 0)$ will be

- A) 0°
- B) -30°
- C) 45°
- D) 60°

Answer : (C)

15 A lot has 10% defective items. Ten items are chosen randomly from this lot. The probability that exactly 2 of the chosen items are defective is

- A) 0.0036
- B) 0.1937
- C) 0.2234
- D) 0.3874

Answer : (B)