Gate-ASSIGNMENT-1

EE24BTECH11043 - Murra Rajesh Kumar Reddy

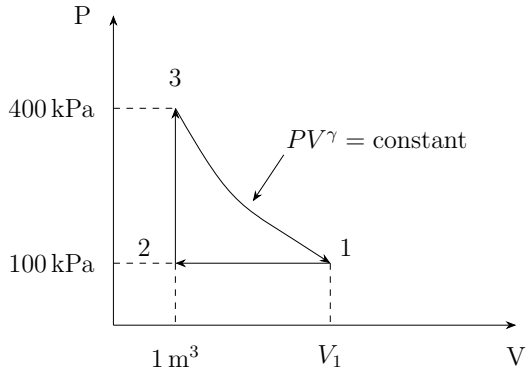
1) In a machine shop, pins of 15 mm diameter are produced at a rate of 1000 per month and the consumed at a rate of 500 per month. The production and the consumption continue simultaneously till the maximum inventory is reached. Then inventory is allowed to reduced to zero due to consumption. The lot size of production is 1000. If backlog is not allowed, the maximum inventory level is
   a) 400
   b) 500
   c) 600
   d) 700
2) The net requirements of an item over 5 consecutive weeks are 50-0-15-20-20. The invetory carrying cost and odering cast are RE. 1 per item per week and RS. 100 per order respectively. Starting inventory is zero. Use ”Least Unit Cost Technique” for developing the plan. The cost of plan (in Rs.) is
   a) 200
   b) 250
   c) 255
   d) 260

Common data questions

Common Data questions for $71, 72, 73$
A gear set has a pinion with 20 teeth and a gear with 40 teeth. The pinion runs at 30 rev/s and transmits a power of 20 kW. The teeth are on the 20° full-depth system and have a module of 5 mm. The length of the line of action is 19 mm.

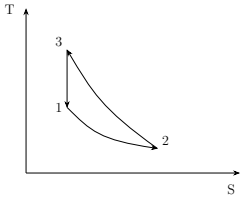
3) The centre distance for the above gear set in mm is
   a) 140
   b) 150
   c) 160
   d) 170
4) The contsct ratio of the contacting tooth is
   a) 1.21
   b) 1.25
   c) 1.29
   d) 1.33
5) The resultant force on the contacting gear tooth in N is
   a) 77.23
   b) 212.20
   c) 225.80
   d) 289.43

Common Data for Questions 74,75:
A thermodynamic cycle with an ideal gas as working fluid is shown below.

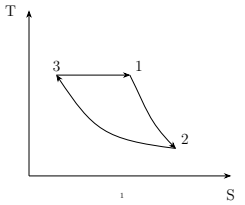


6) The above cycle is represented on $T - S$ plane by

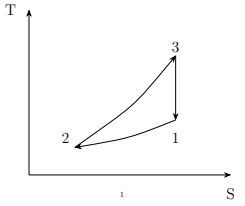
a)



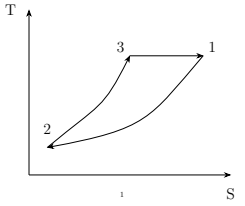
b)



c)



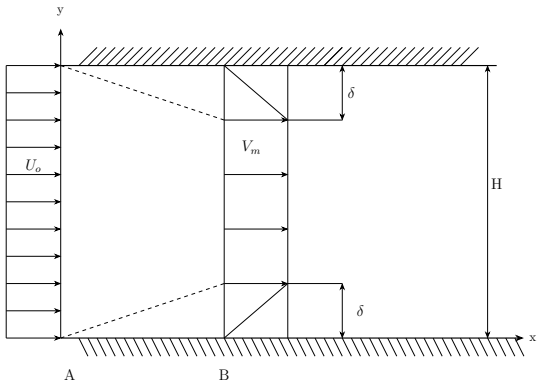
d)



7) If the soecific heats of the working fluid are constant and the value of specific heat ratio γ is 1.4, the thermal efficiency (%) of the cycle is
   a) 21
   b) 40.9
   c) 42.6
   d) 59.7

LINKED ANSWER QUESTIONS: Q.76 TO Q.85 CARRY TWO MARKS EACH.

Statement for Linked Answer Questions 76 & 77:
Cosnider a steady incompressible flow through a channel as shown below.



The velocity proflie is uniform with a value u_o at the inlet section A. The velocity profile at section B downstream is

$$u = \begin{cases} V_m \frac{y}{\delta}, & 0 \le y \le \delta \\ V_m, & \delta \le y \le H - \delta \\ V_m \frac{H-y}{\delta}, & H - \delta \le y \le H \end{cases}$$

8) The ratio V_m/u_o is
   a) $\frac{1}{1-2(\delta/H)}$
   b) 1
   c) $\frac{1}{1-(\delta/H)}$
   d) $\frac{1}{(\delta/H)}$

9) The ratio $\frac{p_A - p_B}{\frac{1}{2}\rho u_o^2}$ (where $p_A$and $p_B$are the pressures at section A and B, respectively, and $\rho$is the denstiy of the
   is
   a) $\frac{1}{(1-(\delta/H))^2} - 1$
   b) $\frac{1}{[1-(\delta/H)]^2}$

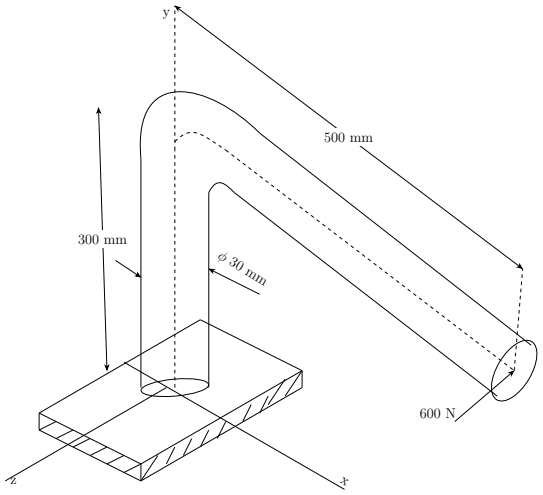
c) $\frac{1}{(1-(2\delta/H))^2} - 1$
d) $\frac{1}{1+(\delta/H)}$

Statement for Linked Answer Questions 78 & 79:
Consider steady one-dimensional heat flow in a plane of 20 mm thickness with a uniform heat generation of 80 MW/m^3. The left and right faces are kept at constant temparature of 160°C and 120°C respectively. The plate has a contant thermal conductivity of 200 W/mK.

10) The location of maximum temperature within the plate from its left face is
a) 15 mm
b) 10 mm
c) 5 mm
d) 0 mm

11) The maximum temperature within the plate in °C is
a) 160
b) 165
c) 200
d) 250

Statement for Linked Answer Questions 80 & 81:



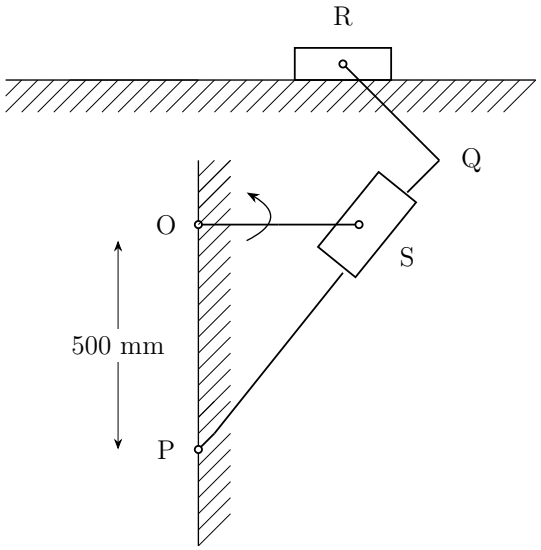
A machine frame shown in the figure below is subjected to a horizontal force of 600N parallel to z-direction.

12) The normal and shear stresses in MPa at point P are respectively
a) 67.9 and 56.6
b) 56.6 and 67.9
c) 67.9 and 0.0
d) 0.0 and 56.6

13) The maximum principal stress in MPa and the orientation of the corresponding principal in degrees are respectively
a) −32.0 and −29.52
b) 100.0 and 60.48

c) -32.0 and 60.48
d) 100.0 and -29.52

Statement for Linked Answer Questions 82 & 83:
A quick return mechanism is shown below. The crank OS is driven ar 2 rev/s in counter-clockwise direction



14) If the quick return ratio is 1:2, then the length of the crank in mm is
    a) 250
    b) $250\sqrt{3}$
    c) 500
    d) $500\sqrt{3}$
15) The anugular speed of PQ in rev/s when the block R attains maximum spped during forward stroke (stroke with slower speed) is
    a) $1/3$
    b) $2/3$
    c) 2
    d) 3

Statement for Linked Answer Questions 84 & 85:
A low carbon steel bar of 147 mm diameter with a length of 630 mm is being turned with uncoated carbide insert. The observed tool lives are 24 min and 12 min for cutting velocities of 90 m/min and

120 m/min respectively. The feed and depth of cut are 0.2 mm/rev and 2 mm respectively. Use the unmachined diameter to caluculate the cutting velocity.

16) When tool life is 20 min, the cutting velocity in m/min is
    a) 87
    b) 97
    c) 107
    d) 114

17) Neglect over-travel or approach of the tool. When tool life is 20 min, the machining time in min for a single pass is
    a) 5
    b) 10
    c) 15
    d) 20