VIT AP

Numerical Methods for Engineers [MAT2001 - 136]

Marks: 50 **Duration: 90 mins.**

NM2001

Answer all the questions.

1) An engineer used the following table of the relative discharging power for the diameter of a pipe. Find the relative discharge capacity for the pipe with diameter 3.5 unit. (12)

Diameter of the pipe	1	2	3	4	5	6
Relative discharging power	1.1	5.66	15.6	32	56	88

2) Using the following data for the heat capacity C_p (kJ/kg K) of methyl cyclohexane C_7H_{14} as a function of temperature (K), interpolate to estimate the temperature T for heat capacity 1.5. (12)

T	150	200	250	300
C_p	1.43	1.54	1.7	1.89

3) The total mass of a variable density rod is given by (12)

$$m = \int_0^L \rho(x) A_c(x) dx$$

where m = mass, $\rho(x)$ = density, $A_c(x)$ = cross-sectional area, x = distance along the rod and L = the total length of the rod. The following data has been measured for a 10-m length rod. Determine the mass in kg to the best possible accuracy.

x, m	0	2	3	4	6	8	10
ρ, g/cm^3	4	3.95	3.89	3.8	3.6	3.41	3.3
A_c, cm^2	100	103	106	110	120	133	150

4) A computer programmer used computer graphics for the rotation of a rod in a plane for his/her animation program. In this context, he/she considered the following data for the computation of (14)

(a) Angular velocity and

(b) Angular acceleration of the rod when $t = 6$ sec.

time t in sec.	0	2	4	6	8	10	12
Angle θ in rad.	0	0.12	0.49	1.12	2.02	3.2	4.67

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