LAST MOMENT TUITIONS

Applied Mathematics 2 - Dec 18

First Year Engineering (Semester 2)

Total marks: 80
Total time: 3 Hours

INSTRUCTIONS
(1) Question 1 is compulsory.
*(2) Attempt any **three** from the remaining questions.*
(3) Draw neat diagrams wherever necessary.

1.a. Evaluate $\int_0^\infty \frac{e^{-x^3}}{\sqrt{x}}$ (3 marks)

1.b. Find the length of the curve x=$\frac{y^3}{3}+\frac{1}{4y}$ from y = 1 to y = 2 (3 marks)

1.c. Solve $(D^2+D)y=e^{4x}$ (3 marks)

1.d. Evaluate $\int_0^1 \int_{x^2}^{x} xy(x+y)\,dy\,dx$ (3 marks)

1.e. Solve (4x + 3y – 4) dx + (3x – 7y – 3) dy = 0 (4 marks)

1.f. Solve $\frac{dy}{dx}$=1+xy with initial condition.

$x_0=0, y_0=0.2$ by Taylor's series method. Find the approximate value of y for x = 0.4 (step size 0.4) (4 marks)

2.a. Solve $\frac{dy}{dx} - 16y = x^2e^{3x} + e^{2x} - \cos 3x + 2^x$ (6 marks)

2.b. Show that $\int_0^\pi \frac{\log(1+a\cos x)}{\cos x}\pi\sin^{-1}a$ $0\le a\le 1$ (6 marks)

2.c. Change the order of integration and evaluate $\int_0^2 \int_{2-\sqrt{4-y^2}}^{2+\sqrt{4.y^2}} dx\,dy$ (8 marks)

3.a. Evaluate ∭(x+y+z)dx dy dz over the tetrahedron bounded by the planes x = 0, y = 0, z = 0 and x + y + z = 1

(6 marks)

3.b. Find the mass of the lamina bounded by the curves $y=x^2-3x$ and y = 2x if the density of the lamina at any point is given by $\frac{24}{25}xy$ (6 marks)

3.c. Solve $x^2\frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + 3y = \frac{\log x.\cos(\log x)}{x}$ (8 marks)

4.a. Find by double integration the area bounded by the parabola $y^2=4x$ and the line $y = 2x – 4$ (6 marks)

4.b. Solve $\frac{dy}{dx}+x\sin 2y=x^3\cos^2 y$ (6 marks)

4.c. Solve $\frac{dy}{dx}=x^3+y$ with initial conditions $y(0) = 2$ at $x = 0.2$ in steps of $h = 0.1$ by Runge Kutta method of fourth order. (8 marks)

5.a. Evaluate $\int_0^1 x^5 \sin^{-1} x \, dx$ and find the value of $\beta(\frac{9}{2},\frac{1}{2})$ (6 marks)

5.b. In a circuit containing inductance L, resistance R, and voltage E, the current I is given by $L\frac{di}{dt}+Ri=E$ find the current i at time t if at $t = 0$, $i = 0$ and L,R,E are constants. (6 marks)

5.c. Evaluate $\int_0^6 \frac{dx}{1+3x}$ by using

i) Trapezoidal

ii) Simpson's (1/3)rd and
iii) Simpsons (3/8)th rule (8 marks)

6.a. Find the volume bounded by the paraboloid.

$x^2+y^2=az$ and the cylinder $x^2+y^2=a^2$ (6 marks)
6.b. Change to polar co-ordinates and evaluate.

$\int_0^1 \int_0^x (x+y)\, dy\, dx$ (6 marks)

6.c. Solve by method of variation of parameters.

$\frac{d^2y}{dx^2}+3\frac{dy}{dx}+2y=e^{e^x}$ (8 marks)