Pg 1/2

FE Sem II (old)
APP. Maths - II.

13/05/15

QP Code : 3110

Old course

(3 hours) [Total Marks: 100

1. Q 1 is compulsory.
2. Solve any four out of the remaining from Q. No. 2 to Q No 7
3. Fig on right hand side indicate full marks.

Q. 1.

a) Using Taylors series method solve $\frac{dy}{dx} = x + y$ with $x_0 = 1, y_0 = 0$ *and carry to* $x = 1.1$ 3

b) Solve $(D^4 - a^4)y = 0$ 3

c) Evaluate $\int_0^1 \int_0^{x^2} e^{\frac{y}{x}} dydx$ 3

d) Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x + y + z)dxdydz$ 3

e) Evaluate $\int_0^4 \sqrt{x}\ (4 - x)^{\frac{3}{2}} dx$ 4

f) Using Euler's method, find the approximate value of y when $\frac{dy}{dx} = xy$, and y=2 when x=0 at x=1 in five steps. 4

Q.2.

a) Evaluate $\int_0^\infty \frac{x^5(1+x^4)}{(1+x)^{16}} dx$ 6

b) Solve using Runge- Kutta method of fourth order $\frac{dy}{dx} = x^2 + y^2$, with the condition x=1 at y=1.5 in the interval (1.1.2) with h=0.1. 6

c) Solve $((1 + y^2)dx = \left(e^{\tan^{-1} y} - x\right)dy$ 8

Q.3.

a) (2xy Cosx^2-2xy+1) dx+ (sin$x^2 - x^2$)$dy = 0$ 6

b) Solve using method of variation of parameters, $(D^2 + 1)y = Cotx$ 6

c) Show that $\int_0^\infty \frac{\log(1+ax^2)}{x^2} dx = \pi\sqrt{a}, a \geq 0.$ 8

[Turn over

FE - Old Sem II

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Pg. 2/2

Q.4.

a) Solve $y(x + y)\,dx - x(y-x)\,dy = 0$ 6

b) Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = 2\log x$ 6

c) Solve $(D^2 - 2D + 1)y = x^2e^{3x}$ 8

Q.5.

a) In a electric 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 when i=0 and L,R,E are constants. 6

b) Change the order of integration. $\int_0^a \int_x^{\frac{a^2}{x}} f(x,y)dxdy$ 6

c) Evaluate $\iiint xyz(x^2 + y^2 + z^2)dxdydz$ over the first octant of the sphere $x^2 + y^2 + z^2 = a^2$ 8

Q. 6.

a) Find the total length of the loop of the curve $9y^2 = (x + 7)(x + 4)^2$ 6

b) Change to polar coordinates and evaluate $\int_0^1 \int_0^x (x + y)dxdy$ 6

c) Evaluate $\iint_R \sqrt{(xy - y^2)}dxdy$ Over the region R of a triangle whose vertices are (0,0),(10,1) and (1,1). 8

Q.7.

a) Change the order of integration and evaluate $\int_0^a \int_y^{\sqrt{ay}} (\frac{x}{x^2+y^2})dxdy$ 6

b) Find by double integration the area of the smaller region bounded by $x^2 + y^2 = a^2$ and x +y = a. 6

c) Find the volume of the tetrahedron bounded by planes, x + y+ z = a, x =0, y =0, z=0 8
