F.E Sem II (CBGS) · 13/5/15
App. Maths-II.

(REVISED COURSE) QP Code : **1037**

(3 Hours) [Total Marks : 80

N.B. (1) Question no. 1 is **compulsory.**
(2) Solve any **three** questions from the remaining **six** questions
(3) **Each** questions carry **equal** marks.

1. (a) Evaluate $\int_0^\infty \frac{x^4}{4^x}dx$ 3

(b) Find P.I. of $(D^2 - 4D + 4)y = e^x + \cos 2x$ 3

(c) Show that $\nabla = 1 - E^{-1}$ 3

(d) Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dydx}{1+x^2+y^2}$ 3

(e) Solve $\left(1+e^{x/y}\right)dx + e^{x/y}\left(1-\frac{x}{y}\right)dy = 0$ 4

(f) Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}dxdy$ by changing to polar co-ordinates 4

2. (a) Solve $y^4 dx = \left(x^{-3/4} - y^3x\right)dy$ 6

(b) Change the order of integration and evaluate 6

$$\int_0^1\int_x^{1/x} \frac{y}{(1+xy)^2(1+y^2)}dy\,dx$$

(c) (1) P.T. $\int_0^\infty \frac{x^{m-1}}{(a+bx)^{m+n}}dx = \frac{1}{a^n b^m}\beta(m,n)$ 4

(2) P.T. $\int_0^\infty \frac{\log(1+ax^2)}{x^2}dx = \pi\sqrt{a}$, where $a > 0$ 4

3. (a) Evaluate $\int_0^{\log 2}\int_0^x\int_0^{x+\log y} e^{x+y+z}dzdydx$ 6

(b) Find the area bounded between the parabola $x^2=4ay$ and $x^2 = -4a\ (y-2a)$ 6

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(c) Solve by the method of variation of parameters 8

$$\frac{d^2y}{dx^2}+y=\sec x\tan x$$

4. (a) Find the length of the cardioid $r= a(1-\cos\theta)$ lying outside the circle $r= a\cos\theta$ 6

(b) Solve $\frac{d^2y}{dx^2}-4\frac{dy}{dx}+3y=2xe^{3x}+3e^x\cos 2x$ 6

(c) Using R.K. Method of fourth order, solve.

$\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ given $y(0)=1$ at $x=0.2, 0.4$ 8

5. (a) Solve $x\sin x\,dy+(xy\cos x-y\sin x-2)dx=0$ 6

(b) Solve $\frac{dy}{dx}=2+\sqrt{xy}$ with x_0=1.2, y_0= 1.6403 by modified Euler's method, for x=1.4 correct to 4-decimal places, (taking h=0.2) 6

(c) Evaluate $\int_0^6 x f(x)dx$ by 8

(a) Trapezoidal rule
(b) Simpson's 1/3rd rule

using the following table

x	0	1	2	3	4	5	6
f(x)	0.146	0.161	0.176	0.190	0.204	0.217	0.230

6. (a) The charge Q on the plate of a condensor of Capacity C charged through a resistance R by a steady voltage V satisfies the differential equation 6

$R\frac{dQ}{dt}+\frac{Q}{c}=V$, If $Q=0$ at $t=0$, show that $i=\frac{V}{R}e^{-t/RC}$ $\because i=\frac{dQ}{dt}$

(b) Evaluate $\iint_A x^2dxdy$ where A is the region in the first qadrant bounded by the hyperbola $xy=16$ and the lines $y=x$, $y=0$ and $x=8$. 6

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