Total No. of Printed Pages:3

SUBJECT CODE NO:- E – 02
FACULTY OF ENGINEERING AND TECHNOLOGY
F.E.(All) (CGPA) Examination Nov/Dec 2017
Engineering Mathematics-II
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i. Question numbers 1 and 6 are compulsory.
ii. Solve any two questions from remaining of each section.
iii. Figure to the right indicate full marks.
iv. Assume suitable data, if necessary.

Section A

Q.1 Solve any five from the following 10

a) The differential equation $\left(1+e^{x/y}\right)dx+e^{x/y}\left(1-\frac{x}{y}\right)dy=0$ is exact then find its solution.

b) State Newton's law of cooling.

c) If $f(x)$ is an even function defined in the interval $(-\pi,\pi)$ then write Fourier series and Fourier coefficient for $f(x)$.

d) If $f(x)=2\pi x-x^3$ in (0,3) then find the value of Fourier coefficient bn.

e) If $f(x)=\sqrt{1-cosx}$, in $(0,2\pi)$, then) find a_0.

f) The curve $y^2(a+x)=x^2(a-x)$ is symmetrical about…….

g) Find the tangent at origin to the curve $y^2(a-x)=x^2(a+x)$.

h) The length of the curve $r=f(\theta)$ from $\theta=a$ to $\theta=b$ is……..

Q.2 a) Solve $(2xy+y-tany)dx+(x^2-x\tan^2 y+\sec^2 y)\,dy=0$. 05

b) Obtain the Fourier series 05
$f(x)=\pi x, 0\le x\le 1$
$\quad\;\;=\pi(2-x), 1\le x\le 2.$

c) Trace the curve $y^2(2a-x)=x^3$ with full justification. 05

Q.3 a) Solve $(x + 2y^3)\ \frac{dy}{dx} = y$. 05

b) Find Fourier series of the function $f(x) = \frac{x(\pi^2 - x^2)}{12}$ in the interval $(-\pi, \pi)$. 05

c) Trace the curve $r = a\ cos2\theta$ with full justification. 05

Q.4 a) An RC circuit has an e.m.f. given in volt by $400\ cos2\ t$. A resistance of 100 ohms, and a capacitance of 10^{-2} farad. Initially $q\ (0) = 0$ find the current i at any time t. 05

b) Find the half range cosine series for $f(x) = e^x$ in the interval $(0, \pi)$. 05

c) Trace the curve $x = a\ (t + sint); y = a(1 + cost)$ with full justification. 05

Q.5 a) Solve $\frac{dy}{dx} + x\ sin2y = x^3 \cos^3 y$. 05

b) Obtain the Fourier series of $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in the interval $0 \le x \le 2\pi$. 05

c) Find the total length of the curve $x = a \cos^3 t; y = \text{a} \sin^3 t$. 05

Section B

Q.6 Solve any five from the following 10

a) Define the Gamma function and evaluate $\int_0^\infty e^{-x} x^2\ dx$.

b) Evaluate $\int_0^{\pi/2} \sin^2 t \cos^5 t\ dt$.

c) Evaluate $\int_1^2 \int_0^{\log r} e^{-\theta}\ d\theta\ dr$.

d) Evaluate $\int_0^a \int_0^b \int_0^c dx\ dy\ dz$.

e) Change the order of integration $\int_0^1 \int_0^x f(x, y) dxdy$.

f) Evaluate $\int \int x^2\ y^3\ dxdy$ over the rectangle $0 \le x \le 1$ and $0 \le y \le 3$.

g) The total volume of the solid formed by the revolution of the area R about x −axis is …..

h) The surface area of solid formed the revolution of the curve $y = f(x)$ about $x -$ axis from $x = a$ to $x = b$ is…..

Q.7 a) Evaluate $\int_0^\infty \frac{x^a}{a^x} dx. a > 0.$ 05

b) Evaluate $\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{dydx}{1+x^2+y^2}$. 05

c) Find the area by double integration bounded by the curves $y^2 = 2 - x, y^2 = x,$ 05

Q.8 a) Evaluate $\int_0^2 x^3 (2-x)^{1/2} \, dx$. 05

b) Change the order of integration $\int_{-a}^a \int_0^{\sqrt{a^2-y^2}} f(x,y) dxdy$. 05

c) Calculate by double integration, the volume generated by the revolution of the cardioid $r = a\,(1 - cos\theta)$ about its axis. 05

Q.9 a) Evaluate $\int_0^\pi x \sin^5 x \cos^4 x \, dx$. 05

b) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} \, dxdy$ by changing to polar co – ordinates. 05

c) Find by triple integration, the volume of the sphere $x^2 + y^2 + z^2 = a^2$. 05

Q.10 a) Prove that $\beta(m,n) = \int_0^\infty \frac{t^{m-1}}{(1+t)^{m+n}} \, dt$. 05

b) Evaluate $\int_{-2}^2 \int_0^z \int_{x-z}^{x+z} (x+y+z) \; dx\, dy\, dz$. 05

c) Calculate the volume of solid bounded by the planes $x = 0, y = 0, x + y + z = a$ and $z = 0$ 05