-Total No. of Printed Pages:2

SUBJECT CODE NO:- P-209
FACULTY OF ENGINEERING AND TECHNOLOGY
F. E. (All) (CGPA) Examination May/June 2017
Engineering Mathematics-II
(Revised)

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

Please check whether you have got the right question paper.

N.B
i. Questions numbers 1 and 6 are compulsory.
ii. Solve any two questions from Q. Nos. 2, 3, 4 and 5.
iii. Solve any two questions from Q. Nos. 7, 8, 9 and 10.
iv. Assume suitable data if necessary.

Section A

Q.1 Attempt the following (any five) 10

a) Reduce $\frac{dy}{dx}+\frac{2y}{x}=y^2x^2$ to linear differential equation.

b) Find the integrating factor of differential equation $(1+x^2)\frac{dy}{dx}+2xy=4x^2$.

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

d) If $f(x)=\left(\frac{\pi-x}{2}\right)^2$; $x\,\epsilon(0,2\pi)$ then find value of Fourier coefficient a_0.

e) Verify whether the function $f(x)=\begin{cases}\frac{1}{2}+x\,; & -\frac{1}{2}<x<0\\ \frac{1}{2}-x\,; & 0<x<\frac{1}{2}\end{cases}$ is an even or odd function.

f) Find the equation of asymptote to the curve $y^2(x+a)=x^2(3a-x)$.

g) Determine the points where the curve $r=a\,(1-cos\theta)$ meets the initial line.

h) Find the length of an arc curve $y=f(x)$ from $x=a\ to\ x=b$.

Q.2 a) Solve $\frac{dy}{dx}=\frac{tany-2xy-y}{x^2-x\tan^2y+\sec^2y}$. 05

b) Find the Fourier series of the function $f(x)=\begin{cases}x\,; & 0<x<\pi\\ 2\pi-x\,; & \pi<x<2\pi\end{cases}$. 05

c) Trace the curve $r=a\,(1+sin\theta)$ with full justification. 05

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

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

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

Q.4 a) Find the current at any time $t>0$ in a circuit having in series a resistor 10 ohm and an inductor 0.2 Henry given that initial current is zero. Find the current when $E=40$volt. 05

b) Find the half range sine series of $f(x)=\frac{100x}{l}\ over\ 0<x<l$. 05

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

Q.5 a) Find the Fourier series of $f(x)=\cos hax$ in the interval$(-\pi,\pi)$. 05

b) Trace the curve $4ay^2=x\,(x-2a)^2$ with full justification. 05

c) Find the total length of the cardioid $r=a\,(1+cos\theta)$. 05

Section B

Q.6 Attempt the following (any five) 10

a) Define Gamma function and Evaluate $\int_0^{\infty} e^{-x} x^{-1/2}\, dx$.

b) State the Reduction formula for $\int_0^{\pi/2} \sin^m \theta \cos^n \theta d\theta$.

c) Evaluate $\int_0^{\pi/2} \int_0^{a\, cos\theta} r^4 dr d\theta$.

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

e) Find the limits for $\iint f(x, y) dxdy$ over the area bounded buy $y = x^2$and x =1.

f) State the formula to find surface area of the solid formed the revolution of the curve x = g (y) about y – axis from y = c to y = d.

g) Find the volume of the solid generated by the curve $y = sinx$ between x = 0 and $x = \pi$.

h) State the formula to find the volume by using triple integration.

Q.7

a) Evaluate $\int_0^{2a} \frac{x^{7/2}}{\sqrt{(2a-x)}}\, dx.$ 05

b) Evaluate $I = \int_0^1 \int_0^{\sqrt{1-x^2}} x^2 y^2 dxdy.$ 05

c) Find the area by double integration bounded by the circles $r = 2cos\theta \; and \; r = 4cos\theta.$ 05

Q.8

a) Evaluate $\int_0^{\infty} x^7 e^{-2x^2}\, dx.$ 05

b) Evaluate $\iint ydxdy$,over the area bounded by the curve $y = x^2, y = x.$ 05

c) Find the surface of the solid generated by revolution of the curve $x = t^2; y = t\left(1 - \frac{t^2}{3}\right)$ about x – axis. 05

Q.9

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

b) Chang the order of integration $I = \int_0^1 \int_{x^2}^{\sqrt{2-x^2}} f(x, y)$dxdy 05

c) Evaluate $\int_1^3 \int_{1/x}^1 \int_0^{\sqrt{xy}} xyzdxdydz$. 05

Q.10

a) Evaluate $\int_0^1 \sqrt{1 - x^4}\, dx.$ 05

b) Change to polar and evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} \frac{xdxdy}{\sqrt{x^2+y^2}}$. 05

c) Find the volume bounded by cylinder $x^2 + y^2 = 4 \,\&\, y + z = 3 \,\&\, z = 0$. 05

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