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SIIIS - N 196 B-16

B.A./B.Sc. IIIrd Semester Degree Examination

Mathematics

(Riemann Integration and Ordinary Differential Equations)

Paper : 3.2

(New)

Time : 3 Hours Maximum Marks : 60

Instructions to Candidates:

Answer **ALL** the Sections.

SECTION - A

I. Answer any **TEN** of the following : **(10×2=20)**

1) Find $U(p,f), if\ f(x)=x^2$ and partition in the interval $[0,1]$ where partition $P=\{0,1/4,\ 2/4,\ 3/4,\ 1\}$

2) If $f\in R[a,c], f\in R(c,b)\ where\ a<c<b$ Then prove that $f\in R[a,b]$.

3) Define upper and lower Riemann Integral and Riemann Integral

4) Solve $p^2-5p-6=0$

5) Solve $y=x+\tan^{-1}p$

6) Find the general and singular solution of $y=px+p^2$

7) Solve $(D^2+4)y=\sin 2x$

8) Solve $(D^2+3D-4)y=12e^{2x}$

9) Solve $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+4y=2x^2$.

10) Solve $\frac{dx}{dt}=3x-y$ *and* $\frac{dy}{dt}=x+y$.

11) Find W (wronskian) if $(1-x)\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=(1-x)^2, n\neq 1$.

12) Show that $x\frac{d^2y}{dx^2}+3\frac{dy}{dx}=\cos x$ is exact.

SECTION - B

II. Answer any **THREE** of the following **(3×5=15)**

1) If $f(x)=x^2$ *for* $x\in[0,1]$ *and* $p=\{0,1/4,2/4,3/4,1\}$ then find $u(p,f)$ *and* $L(p,f)$.

2) Let $f(x)=x^2\ \forall\ x\in[0,a]$ then show that $\int_a^b x^2dx=a^3/3$.

3) If $f\in R[a,b]$ *then* $-f\in R[a,b]$ *and* $\int_a^b(-f(x))dx=-\int_a^b f(x)dx$.

4) If $f(x)$ is continuous function on [a,b] then show that f (x) is R- Integrable.

5) Using first mean value Theorem, show that $\frac{\pi}{4}\leq\int_0^{\pi/4}\sec x\,dx\leq\frac{\pi}{2\sqrt{2}}$

SECTION - C

III. Answer any **FIVE** of the following **(5×5=25)**

1) Solve y, If $xp^2-2yp+ax=0$

2) Find the general solution and singular solution of the function using substitution $(px-y)(x-py)=2p,\left[if\ x^2=u\ \&\ y^2=v\right]$

3) Solve $\left(D^3-3D^2+9D-27\right)y=\cos 3x$

4) Solve $x^2\frac{d^2y}{dx^2}+5x\frac{dy}{dx}+4y=x\log x$.

5) Solve $\left(1+x^2\right)\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y=4\cos\log(1+x)$

6) Solve the equation by changing the independent variable $\frac{d^2y}{dx^2}+(3\sin x-\cot x)\frac{dy}{dx}+2y\sin^2 x=e^{-\cos x}\sin^2 x$.

7) Solve the equation by the method of variation of parameters. $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=x^2e^x$.

8) Show that $(1-x^2)\frac{d^2y}{dx^2}-3x\frac{dy}{dx}-y=0$ $x\neq 1$, is exact given that $y=1$ and $\frac{dy}{dx}=0$ when $x=0$.
