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SIIIS-N-196 B -18
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** questions in all Sections.

SECTION - A

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

1. If $f:[a,b]\to R$ is bounded and $p\in p[a,b]$ then $L(p,-f)=-U(P,f)$ and $U(p,-f)=-L(p,f)$

2. If $f\in R(a,b)$ then $m(b-a)\le\int_a^b f(x)dx\le M(b-a)$ where m and M are infimum and supremum of f on [a,b]

3. Show that a continuous function is $\mathbb{R}$ integrable on $[a,b]$

4. If f is continuous on $[a,b]$, $g\in R[a,b]$ and g keeps the same sign on $[a,b]$ then there exists $c\in[a,b]$ such that $\int_a^b f(x)dx=f(c)\int_a^b g(x)dx$.

5. Solve: $P^2+p-6=0$

6. Solve : $y=p\sin p+\cos p$

7. Find the singularity of $y=p_n-e^p$

8. Solve $\frac{d^2y}{dx^2}-7\frac{dy}{dx}+12y=0$.

9. Solve $(D^3-3D^2+4D-2)y=e^x$

10. Solve $xy''-2(x+1)y'+(x+2)y=(x-2)e^x$. Find the part of the complementary function

11. Show that $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-2y=2x$ is exact

12. Find Wronskim w if $\frac{d^2y}{dx^2}+\frac{dy}{dx}=\cos ecx$

SECTION - B

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

1. Compute L(p,f) and U(p,f) if $f(x)=x$ on $[0,1]$ $p=\{0,\frac{1}{3},\frac{2}{3},1\}$ be a partition of $[0,1]$

2. If $f\in R[a,b]$ then $f^2\in R[a,b]$

3. State and prove second mean value theorem

4. Show that $\frac{1}{3}\le\int_0^1\frac{x^2}{\sqrt{1+x}}dx\le\frac{1}{3\sqrt{2}}$ by using mean value theorem

SECTION - C

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

1. Solve $y=x+2\tan^{-1}p$

2. Solve $y=3px+4p^3$

3. Solve $(D^3+1)y=3+e^{-x}+5e^xx^2$

4. Solve $y''+y'\cot x-y\cos ec^2x=0$ given that cotx is a solution

5. Solve $(x^3D^3 + 2x^2D^2 + 27y = 10(x + x^{-1})$

6. Solve $\frac{d^2y}{dx^2} - 2\tan x\frac{dy}{dx} + 5y = e^x \sec x$ by the removal of first order derivative

7. Solve $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - x^2y = 0$ using transformation $Z = \sin^{-1} x$

8. Solve by Simultaneous differential equation $(Dx - 3x - 2y) = 0$ and $(Dy + 5x + 3y) = 0$
