UUCMS No. | | | | | | | | | | | |

B.M.S COLLEGE FOR WOMEN, AUTONOMOUS

BENGALURU – 560004

SEMESTER END EXAMINATION – MARCH/APRIL- 2023

B.Sc. in Mathematics – III Semester

REAL ANALYSIS- I AND ORDINARY DIFFERENTIAL EQUATIONS

(NEP Scheme 2021-22 onwards)

Course Code: MAT3DSC03 **QP Code: 3015**

Duration: 2 ½ Hours **Max marks: 60**

***Instructions: Answer all the sections*.**

I. Answer any SIX Questions. **(6X2=12)**

1. Define bounded sequence
2. Find the limit of the sequence $\frac{3n-3}{4n+3}$
3. Test the convergence of the series $\frac{1}{1.3}+\frac{2}{3.5}+\frac{3}{5.7}+.....\infty$
4. State Raabes's test for convergence
5. Show that the equation $(x^2-ay)dx+(y^2-ax)dy=0$ is exact
6. Solve $\frac{dy}{dx}+2xy=2e^{-x^2}$
7. Find the particular integral of $(D^2-4D+3)y=e^x$
8. Solve $(D^2-7D+6)y=0$

II. Answer any FOUR Questions. **(4X6=24)**

1. Prove that every convergent sequence is bounded. Is the converse true. Justify your Answer.
2. Discuss the behaviour of the sequence $\left\{n^{1/n}\right\}$
3. Show that the sequence $\left\{x_n\right\}$ defined by $x_1=\sqrt{7}$, $x_{n+1}=\sqrt{7+x_n}$ converges to the positive root of $x^2-x-7=0$
4. State Cauchy's root for a series of positive terms.
5. Discuss the convergence of the series $\frac{2}{3}+\frac{2.4}{3.5}+\frac{2.4.6}{3.5.7}+....\infty$
6. Sum to infinity $1+\frac{1+2}{2!}+\frac{1+2+2^2}{3!}+....$

III. Answer any FOUR Questions: **(4X6=24)**

1.Solve $p^2 + 2py\cot x - y^2 = 0$

2. Solve $\frac{dy}{dx} + \frac{3x^2}{1+x^3}y = \frac{\sin^2 x}{1+x^3}$

3. Find the orthogonal trajectories of family of parabolas $y^2 = 4ax$

4. Solve $(D^2 + 2D + 1)y = 2e^{2x}$

5. Solve the simultaneous equations $\frac{dx}{dt} + 7x - y = 0$ & $\frac{dy}{dt} + 2x + 5y = 0$

6. Solve $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$ by the method of variation of parameters

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