MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST YEAR B.Sc. M.R.T. DEGREE EXAMINATION – JUNE 2018

SUBJECT: BASIC AND APPLIED MATHEMATICS
(2011 SCHEME)

Wednesday, June 20, 2018

Time: 10:00-13:00 Hrs.   Max. Marks: 80

✍ **Answer any FIVE full questions.**

1A. Solve the equation $4x^3 - 12x^2 - 15x - 4 = 0$.

1B. Evaluate:

  i) $\int \dfrac{x^4 - 2x^2 + 4}{\sqrt{x}}\, dx$ ii) $\int e^x \cos x\, dx$

1C. Define order of a differential equation and form the differential equation given that $2x+3y = k$ where k is a constant.

(4+6+6 = 16 marks)

2A. Find the total surface area of a cylindrical tin of radius 17 cm and height 3cm.

2B. If U={1,2,3,4,5,6,7,8,9}, A={1,2,4,6,8}, B={2,4,5,9}, C={X/X is a Positive integer and X²=16}, D ={7,8} Compute the following:

  i) $A \cup B$ ii) $A \cup C$ iii) $\overline{A \cap B}$ iv) $A \Delta B$

  v)   A – B   vi)   B – A   vii) $C \cap D$

2C. Evaluate   i) $\lim_{x \to 0} \dfrac{2 \sin x - \sin 2x}{x^3}$.   ii) $\lim_{n \to \infty} \dfrac{n^2 + n + 1}{3n^2 + 2n - 1}$

(4+6+6 = 16 marks)

3A. Find the volume of a cylinder is 462cc and its diameter is 7 cm. Find the height of the cylinder 12 cm.

3B. State and prove Langranges mean value theorem.

3C. Find Derivative y = uv, using first principle.

(4+6+6 = 16 marks)

4A. Find $\dfrac{dy}{dx}$ when $y = \dfrac{1+x}{1+x^2}$ and also find the value of 3y'(2) + 2 y'(3)

4B. Determine the sets A and B, given that

  i)   A-B={1,4,9}, B-A={2,5,3} and A∪B={1,2,3,4,5,9}

  ii)   A-B={1,2,8,11}, B-A={3,6,9}, and A∩B={}.

4C. Solve $\dfrac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$

(4+6+6 = 16 marks)

5A. i) Find the perimeter of a circle given that radius is 6cm.

ii) A circular swimming pool has a radius of 12 m. Find the circumference of the pool.

5B. Solve the system of euqtions : $x+y+z = 2$; $x+2y+3z = 1$; $3x+y-5z = 4$

5C. If A={3,5,7}, B={6,7,8} and C={7,8,9}then find $(A \cap B) \times (B \cap C)$

(6+4+6 = 16 marks)

6A. Find $\dfrac{dy}{dx}$ i) $y = \dfrac{x}{2} + \dfrac{2}{x} - 2x^2$ ii) $y = \dfrac{x^n - n^x}{e^x}$.

6B. Find the value of $4/3\sec^2(\pi/3) - cosec^2(\pi/6) + 3/4\tan^2(\pi/4) - 2\sin^2(\pi/3)$

6C. Solve $\dfrac{dy}{dx} + y\,secx = tanx$

(6+4+6 = 16 marks)

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