S.B. Roll No...

APPLIED MATHEMATICS-II
2nd Exam/Civil/Mech./ Electrical/ECE/IT/CSE/Auto/Mechatronics/0553/May'19
(FOR 2018 BATCH)

Duration: 3Hrs.   **M.Marks:75**

SECTION-A

Q1. a) Choose the correct answer.   **15x1=15**

    i. $\lim_{\theta \to 0} \sin \frac{2\theta}{\theta}$ is equal to   a) 0   b) 1   c) $\frac{1}{2}$ d) 2

    ii. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x \, dx$ is equal to   a) – 1   b) 0   c) 1   d) 2

    iii. The deviation of $x^2 \log x$ is equal to

         a) X (1 - 2 log x)   b) $\frac{(1 - 2 \log x)}{x}$ c) x(1 + 2 log x)   d) $\frac{(1+ 2 \log x)}{x}$

    iv. Order of differential equation $(y''')^2 + 2y'' + 3y = x$ is

         a) 1   b) 2   c) 3   d) 4

    v. The equation of the normal to the curve $y = \sin x$ at (0, 0) is

         a) x = 0   b) y = 0   c) x+y = 0   d) x-y=0

b) State True or False.

    vi. $\int_{-a}^{a} f(x) \, dx = 0$ If f(x) is odd.

    vii. $\lim_{x \to 0} \frac{\tan 2x}{\tan 3x} = \frac{2}{3}$.

    viii. $\int e^{-mx} \, dx = \frac{e^{-mx}}{m}$.

    ix. $\frac{d}{dx}(x\sin x) = x\cos x$.

    x. Every LPP admits an optimal solution.

c) Fill in the blanks.

    xi. Derivative of x^{10} w.r.t x^5 is _____

    xii. Area of the region bounded by the curve of $y = x-x^2$ between x = 0 and x = 1 is _____

    xiii. Anti derivative of $x\sin x$ w.r.t x is _____

    xiv. $\int_0^{\frac{\pi}{2}} \cos 2x \, dx$ is equal to _____

    xv. If $y = \log x$,then $\frac{d^2x}{dy^2}$ is equal to _____

SECTION-B

Q2. Attempt any six questions.   **6x5=30**

    a. If $x = a(\theta + \sin \theta)$ and $y = a(1- \cos \theta)$,find $\frac{dy}{dx}$.

    b. If $y = e^{m \sin^{-1} x}$ prove that $(1 - x^2) y2 – xy_1 = m^2 y$.

    c. Find the equation of the normal to the curve $y = 6x^2 -5x + 3$ at (1,4).

    d. Solve the differential equation, $ydx – xdy = xydx$.

    e. Evaluate $\int_0^{\pi} \cos^2 \frac{x}{2} dx$.

    f. Integrate $x^2 \cot^{-1} x$.

    g. Find the area of the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ between x = 0 & x = a .

    h. Evaluate $\int \frac{dx}{1+3\sin^2 x}$.

    i. If the side of a square is increasing at the rate of 1m per min., find the rate of increase of its area, when the side of square is 5m.

SECTION-C

Q3. Attempt any three questions.   **3x10=30**

    i. Find the maximum and minimum or extreme values of $2x^3-15x^2+36x+10$.

    ii. Differentiate $x^{\sin x}$ w.r.t $(\sin x)^x$.

iii. Minimize and Maximize z = 5x + 10y subject to the constraints x + 2y ≤120, x + y ≥ 60, x -2y ≥ 0, x, y ≥ 0.
iv. Differentiate y = cos x by first principle.
 v. Find the approximate area under the curve whose ordinates are given below by the method of trapezoidal rule.

x	0	1	2	3	4	5
y	0	2.5	3	4.5	5	7.5

vi. Evaluate :
   a. $\int \sin^{-1} x$.

   b. $\int_1^3 \frac{\cos(\log x)\,dx}{x}$.