CBCS SCHEME

15MATDIP31

43 Third Semester B.E. Degree Examination, Dec.2019/Jan.2020

Additional Mathematics — I

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE fill question from each !nodule.

Module-1

1 a. Find modulus and amplitude of I– cos 9 + i sin 9 . **(05 Marks)**

b. Express $\frac{3+4i}{3-4i}$ in a +ib form. **(OS Marks)**

c. Find the value of 'X,' so that the points A(-1, 4, –3), B(3., 2, –5), C(-3, 8, –5) and D(-3, I), may lie on one plane. **(06 Marks)**

OR

2 a. Find the angle between the vectors a = 5 j+ k and b = 2 3 j+ 6k . **(05 Marks)**

b. Prove that | axb,bxc,cxa l=I abc | **(05 Marks)**

C. Find the real part of $\frac{1}{1+cose+isin 0}$ **(06 Marks)**

Module-2

3 a. Obtain the n^{th} derivatiVe of sin(ax +b). **(05 Marks)**

b. Find the pedal equation of = a" cosne **(05 Marks)**

c. If u = $\frac{Yz}{x}$, v = $\frac{zx}{y}$, w = $\frac{xy}{z}$, show that $\frac{a(u, v, w)}{a(x, y,z)}$ **(06 Marks)**

OR

4 a. If u og (x. ± y / x + y show that x $\frac{all}{aX}$ + y $\frac{ail}{ay}$ =3 .• **(OS Marks)**

b. If u = y, y z — x), show that $\frac{au:.\ au}{ax}$ $\frac{}{ay}$ + $\frac{au}{az}$ =0. **(05 Marks)**

c. If y = a cos(logx) + bsin(log x), show that x^2y,,, + (2n +1)xy,, + (n^2 +1)y,, **=0** **(06 Marks)**

Module-3

5 a. Evaluate $\int_0$ xsin' xdx **(05 Marks)**

b. Evaluate f $x^2(1\ x^2)^{3/2}$ dx **(05 Marks)**

c. Evaluate $\int_{-h}^{b}\int_{-a}^{a}$ f(x2 + y^2 +)dzdydx **(06 Marks)**

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OR

6 a. Evaluate $\int_{0}^{1}\int_{x}^{\sqrt{x}} xy\,dy\,dx$ **(05 Marks)**

b. Evaluate $\int\int\int (x + y + z)\,dx\,dy\,dz$ **(05 Marks)**

c. Evaluate $\int \frac{x^4}{(1 + x^2)^4}\,dx$. **(06 Marks)**

Module-4

7 **a.** If $r = (t^2 + 1)\,i + (4t - 3)\,j + (2t^2 - 6t)\,k$ find the angle between the tangents at t = 1 and t = 2. **(05 Marks)**

b. **If r =** $e^{t}\,i + 2\cos 3t\,\hat{j} + 2\sin 3t\,k$, find the velocity and acceleration at any time t, and also their magnitudes at t = 0. **(05 Marks)**

c. Show that $F = (y + z)\,i + (z + x)\,\hat{j} + (x + y)\,k$ is irrotational. Also find a scalar function 'y such that F = V(1). **(06 Marks)**

OR

8 a. Find the unit normal vector to the surface $x^2 y + 2xz = 4$ at (2, –2, 3). **(05 Marks)**

b. If F = $xz^3\,i - 2x^2 yz\,j + 2yz^4\,k$ find V F and V x F at (1, –1, 1). **(05 Marks)**

c. If $\frac{da}{dt} = w \times a$ and $\frac{db}{dt} = w \times b$, then show that $\frac{d}{dt}(a \times b) = w \times (a \times b)$ **(06 Marks)**

Module-5

9 a. Solve $\sec^2 x \tan y\,dx + \sec^2 y \tan x\,dy = 0$. **(05 Marks)**

b. Solve $(y^3 - 3x^2 y)dx + (3xy^2 - x^3)dy = 0$. **(05 Marks)**

c. Solve $\frac{dy}{dx} + \frac{y}{x} = xy^2$. **(06 Marks')**

OR

10 a. Solve $\frac{dy}{dx} + y \cot x = \cos x$ **(05 Marks)**

b. Solve $x^2 y\,dx - (x^3 + \,)dy = 0$ **(05 Marks)**

c. Solve $y(x + y)dx + (x + 2y - 1)dy = 0$ **(06 Marks)**