[B19 BS 1102]

I B. Tech I Semester (R19) Regular Examinations
MATHEMATICS – II
(Common to CSE, ECE & IT)
MODEL QUESTION PAPER

TIME : 3 Hrs. **Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT**
All questions carry equal marks
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<table>
<tr><th></th><th>UNIT-I</th><th>CO</th><th>KL</th><th>M</th></tr>
<tr><td>1.a)</td><td>Using Newton's forward difference interpolation formula find Y (3), from the following table
<table><tr><td>X</td><td>0</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td></tr><tr><td>Y</td><td>7</td><td>11</td><td>14</td><td>18</td><td>24</td><td>32</td></tr></table></td><td>CO3</td><td>K2</td><td>8</td></tr>
<tr><td>b)</td><td>Find the interpolating polynomial f(x) for the data of the following table
<table><tr><td>x</td><td>0</td><td>1</td><td>4</td><td>5</td></tr><tr><td>f(x)</td><td>4</td><td>3</td><td>24</td><td>39</td></tr></table></td><td>CO3</td><td>K1</td><td>7</td></tr>
<tr><td colspan="2">(OR)</td><td></td><td></td><td></td></tr>
<tr><td>2. a)</td><td>Using Gauss backward formula, find f(42), from the following table
<table><tr><td>X</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td></tr><tr><td>f(x)</td><td>354</td><td>332</td><td>291</td><td>260</td><td>231</td><td>204</td></tr></table></td><td>CO4</td><td>K2</td><td>8</td></tr>
<tr><td>b)</td><td>Using Lagrange's interpolation formula find Y (10) from the following table
<table><tr><td>x</td><td>5</td><td>6</td><td>9</td><td>11</td></tr><tr><td>Y</td><td>12</td><td>13</td><td>14</td><td>16</td></tr></table></td><td>CO4</td><td>K3</td><td>7</td></tr>
<tr><td></td><td>UNIT-II</td><td></td><td></td><td></td></tr>
<tr><td>3.a)</td><td>Find the cube root of 41 using Newton-Raphson method.</td><td>CO5</td><td>K2</td><td>8</td></tr>
<tr><td>b)</td><td>Evaluate $\int_0^2 \frac{dx}{x^3+x+1}$ by using Simpsons 1/3rd rule with $h = 0.25$</td><td>CO5</td><td>K2</td><td>7</td></tr>
<tr><td colspan="2">(OR)</td><td></td><td></td><td></td></tr>
<tr><td>4. a)</td><td>Find a real root of the equation $x \log_{10} x=1.2$ by Regula-false method correct tothree decimal places</td><td>CO5</td><td>K2</td><td>8</td></tr>
<tr><td>b)</td><td>Evaluate $y(0.8)$ using Runge Kutta method given $$y' = (x+y)^{\frac{1}{2}}, y(0.4) = 0.41$$</td><td>CO5</td><td>K3</td><td>7</td></tr>
<tr><td></td><td>UNIT-III</td><td></td><td></td><td></td></tr>
<tr><td>5.a)</td><td>If $U = \tan^{-1}\frac{x^3+y^3}{x-y}$ and $x U_x + y U_y = \sin 2U$, prove that $x^2U_{xx} + 2xy\, U_{xy} + y^2U_{yy} = 2\cos 3U \sin U$.</td><td>CO1</td><td>K2</td><td>8</td></tr>
</table>

b)	If u = $x^2 - 2y^2$, v = $2x^2 - y^2$ where x = rcos θ, y = r sin θ then show that $\frac{\partial(u,v)}{\partial(r,\theta)}$ = 6 r^3 sin 2θ.	CO1	K2	7
(OR)				
6. a)	Expand $x^2y + 3y - 2$ in powers of $(x-1)$ and $(y+2)$ using Taylor's theorem.	CO1	K2	8
b)	By using the method of differentiation under the integral sign prove that $\int_0^\infty \frac{\tan^{-1}(ax)}{x(1+x^2)}$ dx = $\frac{\pi}{2}\log(1+a)$, a $\geq$ 0.	CO1	K3	7
	UNIT-IV			
7. a)	Solve x^2(y - z)p + y^2(z - x)q = z^2(x - y).	CO2	K2	8
b)	solve $(D^2 - DD' - 2D'^2)$ z = (y - 1)e^x.	CO2	K2	7
(OR)				
8. a)	Solve x(y - z)p + y(z - x)q = z(x - y).	CO2	K2	8
b)	solve (D + D' - 1)(D + 2D' - 3)z = 3x + 6y + 4.	CO2	K2	7
	UNIT-V			
9.a)	Obtain the solution of $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$ by the method of separation of variables.	CO6	K2	8
b)	A tightly stretched elastic string of length L, fixed at its end points is initially in a position given by $u(x,0) = u_0 sin^3 \frac{\pi x}{L}$. If it is released from rest, find the displacement at any subsequent time.	CO6	K3	7
(OR)				
10.a)	Obtain the solution of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0$ by the method of separation of variables.	CO6	K2	8
b)	A bar of conducting material of length π units is initially kept at a temperature sin x. Find the temperature at any subsequent time if the ends of the bar are held at zero temperature.	CO6	K3	7