Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

FIRST SEMESTER B.TECH. (COMMON TO ALL BRANCHES)

END SEMESTER MAKEUP EXAMINATIONS, DECEMBER 2016

SUBJECT: ENGINEERING MATHEMATICS – I [MAT1101]

REVISED CREDIT SYSTEM
(27/12/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A.	Solve : $(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = 2\sin(\log(1+x))$	**3**
1B.	Test for consistency and solve by Gauss elimination method $x + 4y - z = -5$ $x + y - 6z = -12$ $3x - y - z = 4$	**3**
1C.	Find $f(41)$ from the following table using Newton's Backward difference formula x: 20, 25, 30, 35, 40, 45 $f(x)$: 354, 332, 291, 260, 231, 204	**4**
2A.	Solve : $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$	**3**
2B.	Find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 0 \\ 0 & -1 & 1 \end{bmatrix}$	**3**

<table>
<tr><td>2C.</td><td>Compute a real root of $3x - cosx - 1 = 0$ using the Newton – Raphson method with $x_0 = 0.5$ correct to 4 decimal places.</td><td>4</td></tr>
<tr><td>3A.</td><td>Solve : $y'' - 2y' + 2y = x + e^x cosx$</td><td>3</td></tr>
<tr><td>3B.</td><td>The viscosity of a certain kind of oil is experimentally measured at different temperatures as shown in the following table :
<table><tr><td>Temperature in ^{0}C</td><td>110</td><td>130</td><td>160</td><td>190</td></tr><tr><td>Viscosity of the oil</td><td>10.8</td><td>8.1</td><td>5.5</td><td>4.8</td></tr></table>Find the viscosity of this oil at 140^0 C, by Lagrange's method of interpolation.</td><td>3</td></tr>
<tr><td>3C.</td><td>Compute y (0.1) by taking h = 0.1 given $\frac{dy}{dx} = xy + y^2$ with $y(0) = 1$ using R – K method of fourth order.</td><td>4</td></tr>
<tr><td>4A.</td><td>Solve $(D^2 + 4)y = tan2x$</td><td>3</td></tr>
<tr><td>4B.</td><td>Solve the system of equations :
$8x - 3y + 2z = 20,$
$4x + 11y - z = 33,$
$6x + 3y + 12z = 36$
using Gauss Seidal method. Carryout four iterations.</td><td>3</td></tr>
<tr><td>4C.</td><td>Define a basis. Test whether the set of vectors {(1,1,0), (1,0,-2), (1,1,1)} form basis for E^3. If so express (1, 2, 3) in terms of basis vectors.</td><td>4</td></tr>
<tr><td>5A.</td><td>Evaluate $\int_0^{\pi/2} \sqrt{cos\theta}\, d\theta$ using Simpson's rule taking 6 equal parts.</td><td>3</td></tr>
<tr><td>5B.</td><td>Find by Taylor's series method, the values of y at x = 0.1 up to fourth derivative term from $\frac{dy}{dx} = x^2y - 1, y(0) = 1.$</td><td>3</td></tr>
<tr><td>5C.</td><td>Obtain an orthonormal basis for E^3 from the following set of vectors :
(1, 1, 1), (-1, 1, 0), (-1, 0, 1).</td><td>4</td></tr>
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