Nepal college of information technology

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| Level: Bachelor | Semester – Spring | Year : 2013 | |
| Programme: BE | | Full Marks : 100 | |
| Course: Engineering Mathematics II | | Time : 3hrs. | |
| *Candidates are required to give their answers in their own words as far as practicable.* | | |
| *The figures in the margin indicate full marks.* | | |
| Attempt all the questions. | | |

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| 1 | a. | Find the magnitude and equation of the shortest distance between the lines | 7 |
|  | b. | Find the equation of sphere through the circle x2+y2 = 4, z = 0 and is cut by the plane x+2y+2z = 0 in a circle of radius 3. | 8 |
| 2 | a. | State and prove Euler’s theorem for homogeneous function of three variables with degree n. | 7 |
|  | b. | If the sum of the dimension of a rectangular swimming pool is given, show that the amount of water in the pool is maximum when it is a cube. | 8 |
| 3 | a. | Evaluate, by reversing the order of integration. | 7 |
|  | b. | Find the volume of the solid whose base is the region in xy-plane that is bounded by the parabola y = 4 – x2 and the line y = 3x, while the top of the solid is bounded by the plane z – x = 4.  **OR**  Evaluate the integral by changing the order of integration: dy dx | 8 |
| 4 | a. | Solve:. | 7 |
|  | b. | Find the general solution of the differential equation: . | 8 |
| 5 | a. | Find the power series solution of he differential equation y’’ = 4y.  **OR**  Define Bessel function of the first kind. Also show that | 7 |
|  | b. | Solve the initial value problem. | 8 |
| 6 | a. | Define Laplace transform. State and prove first shifting theorem of Laplace transform. Using it find Laplace transform of  **OR**  Solve | 7 |
|  | b. | Using the method of Laplace transform, solve the initial value problem  **OR**  Find a equation to the line through (-1,3,2) and perpendicular to the plane x+2y+2z=3, the length of perpendicular and co-ordinate of its foot. | 8 |
| 7 | **Short questions: (2\*5 = 10)**   1. Find I. F of the linear differential equation, 2. Evaluate 3. Verify Eulers theorem for u = x2+y2 4. Find the angle between following pair of planes: 2x + 3y + 5z = 0 and x- 2y+z =20 5. Write down the criteria of maxima and minima of three independent variables | |  |
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