Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 level 1st Semester Examination – Sept. / Oct. 2015
SCT303-1 Mathematical methods

Uva Wellassa University

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Instructions to candidates
Duration: 01 hour
Number of questions: (02) essay questions
Mark allocation: 100 mark
Scientific calculators are allowed
Answer all questions

1.

a. Solve the Following equations.

i. $\operatorname{Cos} z = 0$ (10 mark)

ii. $z^4 + 2z^2 + 2 = 0$ (10 mark)

b. Evaluate $\int \underline{F}.d\underline{r}$ where $\underline{F} = (x - 3y)\underline{i} + (y - 2x)\underline{j}$ and C is the closed curve in the x-y plane where, $x = 2a\ cost\ and\ y = 3asint$ from $t = 0$ to $t = 2\pi$ (20 mark)

c. Show that $\underline{F} = 2xye^z\underline{i} + x^2e^z\underline{j} + x^2ye^z\underline{k}$ is irrotational. (10 mark)

2.

a. Verify the Green's theorem, in the plane for $\oint_c [-y\,dx + x\,dy]$ where, C consists of the portions of the parabolas $x^2 = 4ay$ and $y^2 = 4ax$, which lies in the x-y plane, where "a" is a positive constant. (25 mark)

b. Use Stokes' theorem to evaluate the integral $\int curl\ \underline{F}.\underline{n}ds$,over the surface S, where $S: x^2 + y^2 + z^2 = a^2, z \geq 0$ and $\underline{F} = y\underline{i} + x(1 - 2z)\underline{j} - xy\underline{k}$. (25 mark)

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