THE HONG KONG POLYTECHNIC UNIVERSITY

HONG KONG COMMUNITY COLLEGE

Subject Title : Engineering Mathematics **Subject Code** : CCN2250

Session : Semester Two, 2017/18

Numerical Answers

Question A1

(a) $4374\sqrt{3}+4374i$

(b) $3x^2+3y^2+6x-8y-5=0$

(c) $A=1$ and $\varphi=-\dfrac{5\pi}{6}$

Question A2

(a) $(2,0)$: local maximum point

$(0,0)$: local minimum point

$(1,-1)$, $(1,1)$: saddle points

(b) 1.3308

Question A3

(a) $x^3+y^3+\dfrac{1}{3}e^{3xy}=c$

(b) $y=x\tan x+1+\dfrac{c}{\cos x}$

(c) $\left[\left(\dfrac{y}{x}\right)^2+4\right]^{\frac{1}{2}}=\ln x+c$

Question A4

(a) $\dfrac{1}{s}-\dfrac{1}{s^2}+\dfrac{e^{-s}}{s^2}$

(b) $y=\dfrac{1}{4}\left[1-\cos(2t)\right]-\dfrac{1}{4}\left[t-\dfrac{1}{2}\sin(2t)\right]+\dfrac{1}{4}u_1(t)\left[t-1-\dfrac{1}{2}\sin\left(2(t-1)\right)\right]-\dfrac{1}{2}\sin(2t)$

Question A5

(b)(i) $\left\{(1,1,2)^{\mathrm{T}},\ (-2,0,-3)^{\mathrm{T}}\right\};\ \dim\left(\mathrm{Col}(A)\right)=2$

(b)(ii) $\left\{(-1,1,0,0)^{\mathrm{T}},(3,0,2,1)^{\mathrm{T}}\right\}$; $\dim\left(\mathrm{N}(A)\right)=2$

Question B1

(b)(i) $\dfrac{48}{\sqrt{20}}$

(b)(iii) $4x-16y-3z+5=0$

Question B2

(a) $y=c_1e^{2x}\cos x+c_2e^{2x}\sin x+3e^{2x}+\dfrac{1}{2}\cos x-\dfrac{1}{2}\sin x$

(b) $y=c_1e^{-2x}+c_2xe^{-2x}-e^{-2x}\left(1+\ln x\right)$

(c)(i) $-\dfrac{1}{2}$

(c)(ii) $u=\left(-\dfrac{1}{2}-\dfrac{\sqrt{3}}{2}i\right)v$ or $u=\left(-\dfrac{1}{2}+\dfrac{\sqrt{3}}{2}i\right)v$

Question B3

(a) $z=2^{\frac{1}{4}}e^{-i\frac{\pi}{12}}$, $2^{\frac{1}{4}}e^{i\frac{5\pi}{12}}$, $2^{\frac{1}{4}}e^{i\frac{11\pi}{12}}$ or $2^{\frac{1}{4}}e^{-i\frac{7\pi}{12}}$

(c)(i) $k=-1$

Question B4

(a) $y_1=2e^{t}-2e^{3t}$, $y_2=2e^{-t}-3e^{t}+e^{3t}$ and $y_3=-2e^{-t}+e^{t}-e^{3t}$

(b) $x=10$ (m) and $y=10\sqrt{3}$ (m)