GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI
(An Autonomous Institute of Government of Maharashtra)

CT-I Engineering Mathematics-IV SHU401 [EXTC/ ELPO]

Date: 23/01/2017 **Time: 1hr** **Max. Marks 15**

Q.1 Show that when $|z+1|<1$, $z^{-2}=1+\sum_{n=1}^{\infty}(n+1)(z+1)^n$. **(03)**

Q.2 Attempt any three:- **(12)**

e) State Cauchy integral formula and hence evaluate $\oint_c \frac{3z^2+z}{z^2-1}dz$, where c is the circle $|z-1|=1$.

f) Evaluate: $\int_0^{1+i}(x-y+ix^2)\,dz$ along

i) the straight line from $z=0$ *to* $z=1+i$

iii)the real axis from $z=0$ *to* $z=1$ and then along a line parallel to imaginary axis from z =1 to z= 1+i

g) State Cauchy residue theorem and hence evaluate $\oint_c \frac{z-3}{z^2+2z+5}dz$, where c is the circle

ii) $|z|=1$ ii) $|z+1-i|=2$

h) Evaluate the following integrals by contour integration $\int_0^{2\pi}\frac{d\theta}{5-3\cos\theta}$.

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CT- I Summer -2019 SHU401 ENGG. MATHS-IV (EE/ET/IN) Marks-25

Time- 1 hour Date: 17/01/2019

Q .1) Let $V=R^+$ be the set of all positive reals. Define addition of any two numbers $\bar{x}$ and $\bar{y}$ by the usual multiplication of numbers, that is $\bar{x}+\bar{y}=x.y$. Define scalar multiplication by a scalar k and any $\bar{x} \in R^+$ to be x^k, that is, $k\bar{x}=x^k$. Then show that V is a vector space. (03)

Q.2) Attempt any four: (12)

a) Evaluate: $\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ where C is the circle $|z|=3$.

b) Expand $\frac{1}{z^2-4z+3}$ in the region i) $|z|<1$ ii) $1<|z|<3$ iii) $0<|z-1|<2$.

c) Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the paths (a) $y=x$ (b) $y=x^2$.

d) Evaluate $\int_0^{\pi} \frac{d\theta}{3+2\cos\theta}$ using contour integral in complex plane.

e) Using residue theorem evaluate $\oint_C \frac{(2z-1)}{z(z+1)(z-3)} dz$ where C: $|z|=2$.