

END SEMESTER SUPPLEMENTARY EXAMINATION

FEBRUARY-2019

PAPER CODE - MC-203

TITLE OF PAPER-MATHEMATICS-III

Time: 3:00 Hours

Max. Marks : 40

Note : Answer any five questions from the following questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [a] Discuss the convergence of $\int_0^{\pi/2} \frac{\sin^n x}{x^m} dx$

[b] Define Gamma function and discuss its convergence.

Q.2 [a] Obtain range of α so that $\int_0^{\infty} \frac{x^\alpha}{x+1} dx$ converges.

[b] Show that $B(m, n) = B(m+1, n) + B(m, n+1)$.

Q.3 [a] If $f(z) = u+iv$ is an analytic function of complex variable z

and $u+v = (x-y)(x^2+4xy+y^2)$ then find $f(z)$.

[b] Find image of strip $\frac{1}{4} < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$, and depict the region.

Q.4 [a] What do you mean by conformal transformation; discuss the transformation $w = z + 1/z$ in detail.

[b] Show that $v(x,y) = \ln(x^2+y^2) + x-2y$ is harmonic. Find its conjugate harmonic function. $u(x,y)$ and corresponding $f(z)$.

Q.5 [a] Evaluate $\oint_c \frac{dz}{(z-1)(z-2)(z-3)}$; $c: |z| = 4$, using Cauchy's

integral theorem

[b] Expand $\frac{7z-2}{z(z+1)(z-2)}$ as a Laurent series in $1 < |z+1| < 3$.

Q.6 [a] Evaluate the integral $\oint_c \frac{e^z}{(z+2i)^3(z+i)} dz$ c: $|z| = 2.5$.

[b] Evaluate $\int_0^{2\pi} \frac{\cos \theta}{13-12 \cos 2\theta} d\theta$.

Q.7 [a] Find inverse Z-transform of $\frac{1}{z(z-2)^2}$:

[b] Solve $y_{n+2} - 2y_{n+1} + y_n = n$, $y_0=1$, $y_1=1$, using Z- transform.