INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
END SEMESTER EXAMINATIONS - DECEMBER 2018
B. SC (NAUTICAL SCIENCE)
Semester: I
NAUTICAL MATHEMATICS (UG21T3102)

Date: 29.12.2018 Max. Marks: 70

Time:3 Hrs. Pass Marks: 35

Note: **Part – A is compulsory.**

PART – A

(5x2=10 Marks)

1. a). How are the angles and sides of a polar triangle and spherical triangle related.

   b). Find the n^{th} derivative of $e^x (3x+2)^3$

   c). If $u=3Z^2x + 4y^3 + 5xyz$ prove

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 3u$$

   d). Prove $\Gamma(\frac{1}{2}) = \sqrt{\pi}$

   e). Evaluate the modulus and amplitude of $2+i\sqrt{3}$

PART -B

Answer Any Five questions. All questions carry equal marks.

(5x12=60 Marks)

2. a) In spherical triangle PQR, PQ=52°11′,Q=69°47′ and QR=90°.Calculate P,R, and PR.

   b) In spherical triangle LMN,M=33°14.0′ m=80°05′ ,n=70°12′. Calculate N. (6+6 Marks)

3 a) In spherical triangle PZX,X=85°18′,x=90° and z=73°12′.Calculate p,P,z

b) In spherical triangle PQR,P=57°30.5′ and Q=95°17′ and R=70°11′.Calculate p,q,r. (6+6 Marks)

4 a) Evaluate $\int_R x^2 dxdy$ where R is the region in the first quadrant bounded by the lines x=y,y=0,x=8 and the curve xy=16

b) Change the order of integration in $I=\int_0^1 \int_{x^2}^{2-x} xy\, dxdy$ and hence evaluate the same. (6+6 Marks)

5 a) Find the volume bounded by the cylinder $x^2+y^2=4$ and the planes y+z=4 and z=0

b) Find the area lying inside the cardioid r=a (1+cosϑ) and outside the circle z=0 (6+6 Marks)

6 a) Express the integral $\int_0^1 \frac{dx}{\sqrt{1-x^4}}$ in terms of gamma function.

b) Prove that $\beta(m,n)=\frac{\Gamma m \Gamma n}{\Gamma(m+n)}$ (6+6 Marks)

7 a) If 2cos θ=x+$\frac{1}{x}$ Prove that 2cos $r\theta=x^r+\frac{1}{x^r}$

b) Expand $\cos^8\theta$ in a series of cosines of multiples of θ (6+6 Marks)

8 a) Separate $\tan^{-1}$(x+iy)into real and imaginary parts.

b) Find the equation whose roots are 2cos $\frac{\pi}{7}$, 2cos $\frac{3\pi}{7}$, 2cos $\frac{5\pi}{7}$ (6+6 Marks)

9 a) If $y^{1/m}+y^{-1/m}=2x$, prove that
$(x^2-1)y_{n+2}+(2n+1)xy_{n+1}+(n^2-m^2)y_n=0$

b) Expand $e^{\sin x}$ by maclaurin's series upto the term containing x^4. (6+6 Marks)

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