GANPAT UNIVERSIT

B.Tech. Semester – IV(CBCS) (Marine) Regular Examination May – June 2016

Sub: (2MR403) Mathematics for Marine Engineering

Time: 03 HRS   **Total Marks: 60**

Instructions:

(1) This Question papers has two sections. Attempt each section in separate answer book.

(2) Figures on right indicate marks.

(3) Be precise and to the point in the answering the descriptive questions.

SECTION – I

Que – 1

(A) Obtain fourier series for $f(x) = x$, $0 < x < 2\pi$ & deduce $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} \cdots$ [5]

(B) Find fourier series for $f(x) = \begin{cases} -\pi \; ; \; -\pi < x < 0 \\ x \; ; \;\; 0 < x < \pi \end{cases}$ [5]

OR

Que – 1

(A) Find fourier series to represent x^2 in the interval $(-c, c)$.   [5]

(B) Find Half – range cosine series for $f(x) = (x-1)^2$ in the interval $(0, 1)$ [5]

Que – 2

(A) Use Newton's forward interpolation formula to find y at x = 82.   [5]

x	80	85	90	95	100
y	5026	5674	6362	7088	7854

(B) Find first and second order derivatives at x = 2.2 for given data.   [5]

x	1.2	1.4	1.6	1.8	2.0	2.2
y	3.320	4.055	4.950	6.055	7.390	9.025

OR

Que – 2

(A) Apply Lagrange's interpolation technique for find y at x = 10   [5]

x	5	6	9	11
y	12	13	14	16

(B) Use Newton's Backward interpolation formula to find y at x = 185.   [5]

x	140	150	160	170	180
y	3.685	4.854	6.302	8.076	10.225

Que – 3

(A) Evaluate $\int_0^6 \frac{dx}{1+x}$ with $h = 1$ using both the simpson's rules. [4]

(B) **Attempt any Two (each carry three marks)**

(1) Obtain Picard's second approximate solution for $y' = x^2 + y^2$; $y(0) = 0$ for $x = 0.4$ [3]

(2) Use Euler's method to find an approximate value of y for $x = 1$ given that $\frac{dy}{dx} = x + y$; $y = 1$ when $x = 0$ and $h = 0.1$ [3]

(3) Apply $R - K$ fourth order method to find y at $x = 1.4$ given that $\frac{dy}{dx} = xy$; $y(1) = 2$ and $h = 0.2$ [3]

SECTION – II

Que – 4

(A) Find correlation coefficient and probable error for given data. [5]

x	50	60	75	84	47	52	59	44	33	46
y	45	52	50	65	40	65	50	60	32	51

(B) Obtain two regression lines for following data. [5]

x	91	97	108	121	67	124	51	73	111	57
y	71	75	69	97	70	91	39	61	80	47

OR

Que – 4

(A) Calculate rank correlation coefficient for given data. [5]

x	50	50	50	60	65	65	65	60	60	50
y	11	13	14	16	16	15	15	14	13	13

(B) Derive the formula for finding correlation coefficient for (x_i, y_i). [5]

Que – 5

(A) Solve: (i) $(D^2 + 9)y = \cos 2x + \sin 2x$ (ii) $(D^3 - 6D^2 + 11D - 6)y = e^{-2x}$ [4]

(B) Solve: $(D^2 + a^2)y = \csc ax$ by method of variation of parameters. [3]

(C) Solve: $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 2y = x \log x$ [3]

Que – 5

(A) Solve $(3x + 2)^2 y'' + 3(3x + 2)y' - 36y = 3x^2 + 4x + 1$ [5]

(B) Solve the following linear simultaneous differential equations. [5]

$$\frac{dx}{dt} - \frac{dy}{dt} - y = -e^t, \quad x - y + \frac{dy}{dt} = e^{2t}$$

Que – 6   **Attempt any Two (each carry five marks)**

(A) For studying a characteristic the units of population are $10, 12, 20, 22$ [5]
& 26. How many samples of size 2 with replacement can be taken from
it? Check whether the following results are true or not.
(i) $E(\bar{x}) = \bar{y}$ (ii) $E(s^2) = S^2$

[5]

(B) 8 units of population are divided in to two stratas. Units of first stratum
are $2, 8, 10, 12$ and those of the second stratum are $14, 16, 20,$ and 26.
Random samples of size 2 are taken from each stratum then find the value
of population mean and variance of stratified mean.

(C) (1) Solve $y'' + 4y' + 5y = 0$ given that $y(0) = 2$ and $y'(0) = y''(0)$ [3]
(2) In standard notation derive $y - \bar{y} = b_{yx} (x - \bar{x})$ [2]

End of Paper