g. 1/3 FE-I (CBSGS) App. Maths - I 12/5/15

QP Code : **1002**

(REVISED COURSE)

(3 Hours) [**Total Marks : 80**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **three** questions from remaining.
(3) Assume suitable data if necessary.

Correction Attached
No of corrections - 02

1. (a) If $\tan\frac{x}{2} = \tanh\frac{u}{2}$ then S.T. 3

$$u = \log\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)$$

(b) If $u = x^y$ find $\frac{\partial^3 u}{\partial x\,\partial y\,\partial x}$ 3

(c) If $ux = yz,\ vy = zx,\ wz = xy$ 3

find $J\left(\frac{u,v,w}{x,y,z}\right)$

(d) If $y = (x-1)^n$ then P.T. $y+\frac{y_1}{1!}+\frac{y_2}{2!}+\frac{y_3}{3!}+\ldots\frac{y_n}{n!}=x^n$ 3

(e) P.T. $\sinh x = X + \frac{x^3}{3!}+\frac{x^5}{5!}+\frac{x^7}{7!}+$ 4

(f) Express the matrix A as sum of Hermition and skew Hermition matrix where 4

$$\begin{bmatrix} 3i & -1+i & 3-2i \\ 1+i & -i & 1+2i \\ -3-2i & -1+2i & 0 \end{bmatrix}$$

2. (a) Solve $x^7 + x^4 + i(x^3+1) = 0$ 6

(b) Reduce the matrix A to normal form and hence find its rank where 6

$$A=\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 4 & 3 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

[TURN OVER

g. 3/3 FE-I (CBSGS) AM-I 12/5/15

6. (a) Determine linear dependance or independance of vectors 6
$x_1 = [1, 3, 4, 2]$ $x_2 = [3, -5, 2, 6]$
$x_3 = [2, -1, 3, 4]$ and if dependent find the relation between them.

(b) If $u = x^2 - y^2$, $v = 2xy$ and $z = f(u, v)$ prove that 6

$$\left(\frac{\partial z}{\partial x}\right)^2+\left(\frac{\partial z}{\partial y}\right)^2 = 4\sqrt{u^2+v^2}\left[\left(\frac{\partial z}{\partial u}\right)^2+\left(\frac{\partial z}{\partial v}\right)^2\right]$$

(c) (i) Evaluate $\lim_{x\to 0}\frac{\sin x.\sin^{-1}x - x^2}{x^6}$ 4

(ii) Fit straight line to the following data 4
(x, y) = (–1, –5), (1, 1), (2, 4), (3, 7), (4, 10)
Estimate y when x =7

MUPD15025 ANJUMAN-I-ISLAM'S KALSEKAR TECHNICAL CAMPUS, COLLEGE OF ENGINEERING

FE-I (CBSGS)
Pg. 2/3 AM-I 12/5/15

(c) State and prove Euler's theorem for three variables and hence find 8

$x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial x}$ where

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

3. (a) Solve the following system of equations 6

$2x - 2y - 5z = 0$
$4x - y + z = 0$
$3z - 2y + 3z = 0$
$x - 3y + 7z = 0$

(b) Find the maximum and minimum values of $x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$ 6

(c) Separate into real and imaginary parts of $\tanh^{-1}(x + iy)$ 8

4. (a) If $u = 2xy$, $v = x^2 - y^2$ and $x = r\cos\theta$, $y = r\sin\theta$ then find 6

$\frac{\partial(u_1 v)}{\partial(\partial_1 \theta)}$

(b) If $i^{i^{i^{\cdot^{\cdot^{\infty}}}}} = A + iB$, prove that 6

$\left(\frac{\pi A}{2}\right)=\frac{B}{A}$ and $A^2 + B^2 = e^{-\pi B}$

(c) Solve by crouts method the system of equations 8

$3x + 2y + 7z = 4$
$2x + 3y + z = 5$
$3x + 4y + z = 7$

5. (a) By using De Moiverse thm 6

Express $\frac{\sin 7\theta}{\sin\theta}$ in powers of $\sin\theta$ only.

(b) By using Taylor's series expand $\tan^{-1} x$ in positive powers of $(x-1)$ upto first four non-zero terms. 6

(c) If $y = \sin[\log(x^2 + 2x + 1)]$ prove that 8

$(x + 1)^2 y_{n+2} + (2n+1)(x+1)y_{n+1} + (n^2 + 4)y_n = 0$

[TURN OVER

Course: F.E. (REV.) (ALL BRANCHES) (CBSGS) (SEM-I)(Prog-569)

Q.P Code: 1002

Correction:

Q. No.(4)(a)

Read AS:

$\frac{\partial(u,v)}{\partial(r,\theta)}$

Instead of:

$\frac{\partial(u_1 v)}{\partial(\partial_1 \theta)}$

Q. no. (3)(A) Equation no. 3

Read AS:

3x - 2y + 3z = 0

Instead of:

3z - 2y + 3z = 0

Query Update time: 12/05/2015 11:18 AM

Note : Take printouts and submit them to all concerned students.

Course: F.E. (REV.) (ALL BRANCHES) (CBSGS) (SEM-I)(Prog-569)

Q.P Code: 1002

Correction:

Q. No.(2)(c)

Read AS:

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

Instead of:

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

Q. No.(4)(b)

Read AS

$$\tan\left(\frac{\pi A}{2}\right)=\frac{B}{A}$$

Instead of:

$$\left(\frac{\pi A}{2}\right)=\frac{B}{A}$$

Query Update time: 12/05/2015 12:00 AM

Note : Take printouts and submit them to all concerned students.