

Seat No.: \_\_\_\_\_  
No. \_\_\_\_\_

Enrolment

## GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma Engineering - SEMESTER-II • EXAMINATION – WINTER • 2014  
Subject Code: 3320003 Date: 24-12-2014  
Subject Name: Advanced Mathematics (Group-2)

Time: 10:30 am - 01:00 pm

Total Marks: 70

1. Attempt ALL questions.
2. Make Suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of SIMPLE CALCULATOR is permissible. (Scientific/Higher Version not allowed)
5. English version is authentic.

**Q.1** Fill in the blanks using appropriate choice from the given options. **14**

- 1 The slope of line  $2x + y - 8 = 0$  is .....  
(a) 2 (b) -2 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
- 2 X intercepts of line  $2x + 3y - 4 = 0$  is .....  
(a) 2 (b) -2 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
- 3 The distance between the points (1,1) and (2,-1) is .....  
(a) 5 (b) 25 (c)  $\sqrt{5}$  (d) 15
- 4 The centre of the circle  $x^2 + y^2 = 25$  is .....  
(a) (0,5) (b) (0,0) (c) (5,5) (d) (5,0)
- 5 If  $f(x) = \log(e^x)$  then  $f(0) = \dots\dots\dots$   
(a) 0 (b) 1 (c) 2 (d) e
- 6  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = \dots\dots\dots$   
(a) 1 (b) -1 (c) 0 (d)  $\alpha$
- 7  $\frac{d}{dx}(a^x) = \dots\dots\dots$   
(a)  $a^x$  (b)  $a^x \log_e a$  (c)  $x^a \log_e a$  (d)  $\log_e a$
- 8  $\frac{d}{dx}(\log \sin x) = \dots\dots\dots$   
(a)  $\sin x$  (b)  $\cot x$  (c)  $-\cot x$  (d)  $\tan x$
- 9  $\frac{d}{dx}(\tan^{-1} x + \cot^{-1} x) = \dots\dots\dots$   
(a) 1 (b) -1 (c) 0 (d)  $\frac{\pi}{2}$
- 10  $\int \frac{1}{1+x^2} dx = \dots\dots\dots + c$   
(a)  $\sin^{-1} x$  (b)  $\cos^{-1} x$  (c)  $\tan^{-1} x$  (d)  $\cot^{-1} x$
- 11  $\int (\sin^2 x + \cos^2 x) dx = \dots\dots\dots + c$   
(a) 1 (b) x (c)  $\sin 2x$  (d)  $\cos 2x$
- 12  $\frac{d}{dx}(x^2 + 2x + 7) = \dots\dots\dots$   
(a)  $2x + 7$  (b)  $2x + 2$  (c)  $2x^2 + 2$  (d)  $2x^2 + 7$

- 13 If mean of 4,7,6,k,5,9 is 6 then k=.....  
 (a) 4 (b) 5 (c) 6 (d) 9
- 14 If given data is 8,7,4,5,6,9,7,3,8, and 7 then Mode is .....  
 (a) 5 (b) 7 (c) 8 (d) 9
- Q.2 (a)** Attempt any two **06**
1. Prove that (4,8) (4,12) and  $(4+2\sqrt{3}, 10)$  are the vertices of an equilateral triangle
  2. Find the equation of line passing through points  $(-1, 2)$  and  $(1, -2)$  also find the slope of line
  3. Find centre and radius of circle  $x^2 + y^2 - 2x + 4y - 1 = 0$
- (b)** Attempt any two **08**
1. If  $f(x) = \log\left(\frac{1-x}{1+x}\right)$  then prove that  $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$
  2. Evaluate :  $\lim_{x \rightarrow 2} \frac{x^4 - 8x^2 + 16}{x^3 - 3x^2 + 4}$
  3. Evaluate :  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$
- Q.3 (a)** Attempt any two **06**
1. If  $y = x^2 \tan x$  then Find  $\frac{dy}{dx}$
  2. If  $y = \log(\sec x + \tan x)$  then Find  $\frac{dy}{dx}$
  3. If  $y = x^x$  then Find  $\frac{dy}{dx}$
- (b)** Attempt any two **08**
1. If  $y = \frac{1 + \sin x}{1 - \sin x}$  then find  $\frac{dy}{dx}$
  2. If  $y = \log\left[x + \sqrt{1+x^2}\right]$  then prove that  $(1+x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$
  3. The Motion of a particle is given by  $s = t^3 + 2t^2 - 3t + 5$  find the velocity and acceleration at  $t=1$ sec. and  $t=2$  sec.
- Q.4 (a)** Attempt any two **06**
1. Evaluate:  $\int \frac{x^4 + x^2 + 1}{x^2 + 1} dx$
  2. Evaluate:  $\int \frac{2 + 3 \sin x}{\cos^2 x} dx$
  3. Evaluate:  $\int e^{\tan x} \sec^2 x dx$
- (b)** Attempt any two **08**
1. Evaluate:  $\int xe^x dx$
  2. Evaluate:  $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$
  3. Using integration Find the area of circle  $x^2 + y^2 = a^2$
- Q.5 (a)** Attempt any two **06**

1. Evaluate:  $\lim_{x \rightarrow \alpha} \frac{x(x+1)}{x^2+5x+6}$
2. Show that the points  $(a, b+c), (b, c+a)$  and  $(c, a+b)$  are collinear
3. Show that the line  $3x-2y+5=0$  and  $2x+3y-7=0$  are mutually perpendicular

(b) Attempt any two

08

1. Find the Median of the frequency distribution given in the following table

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
freq.	2	3	8	14	8	3	2

2. Calculate the mean deviation from the median  
34,38,42,44,46,48,54,55,63,70.
3. Calculate the standard deviation for the following data  
69,67,68,66,69,64,63,65,72.

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Q.1

ચોગ્ય વિકલ્પ પસંદ કરી ખાલી જગ્યા પૂરો.

14

- 1 રેખા  $2x+y-8=0$  નો ઢાળ ..... થાય  
(a) 2 (b) -2 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
- 2 રેખા  $2x+3y-4=0$  નો X અક્ષ પર નો અંતઃખંડ ..... છે  
(a) 2 (b) -2 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
- 3 બિંદુઓ (1,1) અને (2,-1) વચ્ચેનું અંતર ..... થાય  
(a) 5 (b) 25 (c)  $\sqrt{5}$  (d) 15
- 4 વર્તુળ  $x^2+y^2=25$  નું કેન્દ્ર ..... થાય  
(a) (0,5) (b) (0,0) (c) (5,5) (d) (5,0)
- 5 જો  $f(x)=\log(e^x)$  તો  $f(0)=$  .....  
(a) 0 (b) 1 (c) 2 (d) e
- 6  $\lim_{x \rightarrow 0} \frac{\sin x}{x} =$  .....  
(a) 1 (b) -1 (c) 0 (d)  $\alpha$
- 7  $\frac{d}{dx}(a^x) =$  .....  
(a)  $a^x$  (b)  $a^x \log_e a$  (c)  $x^a \log_e a$  (d)  $\log_e a$
- 8  $\frac{d}{dx}(\log \sin x) =$  .....  
(a)  $\sin x$  (b)  $\cot x$  (c)  $-\cot x$  (d)  $\tan x$
- 9  $\frac{d}{dx}(\tan^{-1} x + \cot^{-1} x) =$  .....  
(a) 1 (b) -1 (c) 0 (d)  $\frac{\pi}{2}$
- 10  $\int \frac{1}{1+x^2} dx =$  ..... + c  
(a)  $\sin^{-1} x$  (b)  $\cos^{-1} x$  (c)  $\tan^{-1} x$  (d)  $\cot^{-1} x$
- 11  $\int (\sin^2 x + \cos^2 x) dx =$  ..... + c

- (a) 1                      (b) x                      (c)  $\sin 2x$                       (d)  $\cos 2x$

- 12  $\frac{d}{dx}(x^2 + 2x + 7) = \dots\dots\dots$   
 (a)  $2x + 7$                       (b)  $2x + 2$                       (c)  $2x^2 + 2$                       (d)  $2x^2 + 7$
- 13 4,7,6,K,5,9 4 નો મધ્યક 6 હોય તો  $K = \dots\dots\dots$   
 (a) 4                      (b) 5                      (c) 6                      (d) 9
- 14 અવલોકનો 8,7,4,5,6,9,7,3,8, અને 7 નો બહુલક  $\dots\dots\dots$  છે.  
 (a) 5                      (b) 7                      (c) 8                      (d) 9

**Q.2 (a)** કોઈ પણ બે ગણો. **06**

1. દર્શાવો કે (4,8) (4,12) અને  $(4 + 2\sqrt{3}, 10)$  સમભૂજ ત્રિકોણ નાં શિરોબિંદુ છે.
2. બિંદુઓ  $(-1, 2)$  અને  $(1, -2)$  માંથી પસાર થતી રેખા નું સમીકરણ શોધો. અને રેખા નો ઢાળ શોધો
3. વર્તુળ  $x^2 + y^2 - 2x + 4y - 1 = 0$  નું કેન્દ્ર અને ત્રિજ્યા મેળવો.

**(b)** કોઈ પણ બે ગણો **08**

1. જો  $f(x) = \log\left(\frac{1-x}{1+x}\right)$  તો સાબિત કરો કે  $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$
2. કિંમત શોધો :  $\lim_{x \rightarrow 2} \frac{x^4 - 8x^2 + 16}{x^3 - 3x^2 + 4}$
3. કિંમત શોધો :  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$

**Q.3 (a)** કોઈ પણ બે ગણો **06**

1. જો  $y = x^2 \tan x$  તો  $\frac{dy}{dx}$  શોધો.
2. જો  $y = \log(\sec x + \tan x)$  તો  $\frac{dy}{dx}$  શોધો.
3. જો  $y = x^x$  તો  $\frac{dy}{dx}$  શોધો.

**(b)** કોઈ પણ બે ગણો **08**

1. જો  $y = \frac{1 + \sin x}{1 - \sin x}$  તો  $\frac{dy}{dx}$  શોધો.
2. જો  $y = \log\left[x + \sqrt{1+x^2}\right]$  હોયતો સાબિત કરોકે  $(1+x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0$
3. એક કણની ગતિ નું સમીકરણ  $s = t^3 + 2t^2 - 3t + 5$  હોય તો  $t=1$  અને  $t=2$  sec. આગળ તેનો વેગ તથા પ્રવેગ શોધો.

**Q.4 (a)** કોઈ પણ બે ગણો **06**

1. કિંમત શોધો :  $\int \frac{x^4 + x^2 + 1}{x^2 + 1} dx$
2. કિંમત શોધો :  $\int \frac{2 + 3 \sin x}{\cos^2 x} dx$
3. કિંમત શોધો :  $\int e^{\tan x} \sec^2 x dx$

(b) કોઈ પણ બે ગણો

08

1.  $\int xe^x dx$  મેળવો.

2.  $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$  મેળવો.

3. સંકલનની મદદથી વર્તુળ  $x^2 + y^2 = a^2$  નું ક્ષેત્રફળ મેળવો.

Q.5 (a) કોઈ પણ બે ગણો

06

1. કિંમત શોધો :  $\lim_{x \rightarrow \alpha} \frac{x(x+1)}{x^2+5x+6}$

2. સબિત કરોકે બિંદુઓ  $(a,b+c), (b,c+a)$  અને  $(c,a+b)$  સમરેખ છે.

3. બતાવો કે રેખાઓ  $3x-2y+5=0$  અને  $2x+3y-7=0$  પરસ્પર લંબછે.

(b) કોઈ પણ બે ગણો

08

1. નીચેના આવૃત્તિ વિતરણ નો મધ્યસ્થ શોધો.

વર્ગ	10-20	20-30	30-40	40-50	50-60	60-70	70-80
આવૃત્તિ	2	3	8	14	8	3	2

2. નીચે આપેલી માહિતી પરથી મધ્યસ્થ થી સરેરાશ વિચલન શોધો.

34,38,42,44,46,48,54,55,63,70.

3. નીચેની માહિતી માટે પ્રમાણિત વિચલન ગણો.

69,67,68,66,69,64,63,65,72.

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