

**APPLIED MATH-II**  
2nd Exam/COMMON/2354/Dec'11

Duration: 3 Hrs.

Max. Marks: 75

NOTE: ATTEMPT ALL QUESTIONS.

<b>Section-A</b>		
Q1.	Choose the correct answer:	5
1)	The order of the differential equation $\left(1 + \left(\frac{dy}{dx}\right)^2\right)^3 = \left(\frac{d^2y}{dx^2}\right)^3$ is	
	a) 2      b) 3      c) 6      d) 1	
2)	The probability that a card drawn at random from a pack of cards is a queen or heart is a) $1/13$ b) $1/2$ c) $4/13$ d) $1/4$	
3)	$\int_0^{\pi/2} \cos x \cdot e^{\sin x} dx =$	
	a) 0      b) 1      c) e      d) e-1	
4)	The point on the curve $y = 3x^2 - 12x + 6$ at which tangent is parallel to x-axis is a) (2,-6)      b) (2,6) c) (-2,6)      d) (-2,-6)	
5)	If A is a non singular Matrix then $A^{-1}$ is a) $ A  \text{ adj } A$ b) $\frac{\text{Adj } A}{ A }$ c) $(\text{adj } A)^T$ d) $\frac{(\text{Adj } A)^T}{ A }$	
Q2.	State True or False	5
1)	If $A = \begin{bmatrix} 3 & -1 \\ 7 & 2 \end{bmatrix}$ & $B = \begin{bmatrix} 1 & 3 \\ 0 & 4 \end{bmatrix}$ Then $AB = \begin{bmatrix} 3 & 13 \\ 7 & 13 \end{bmatrix}$	
2)	$d/dx(x \sin x) = x \cos x$	
3)	If $\lim_{x \rightarrow 2} \frac{x^n - 2^n}{x - 2} = 80$ Then $n=6$	
4)	The Maximum value of $xy$ subject to $x+y=8$ ia 16.	
5)	$\int e^{-mx} dx = \frac{e^{-mx}}{m}$	
Q3.	Fill in the blanks:-	5
1)	If $\begin{vmatrix} 8 & k \\ 4 & 5 \end{vmatrix} = 0$ Then $k =$ _____	
2)	$\lim_{x \rightarrow 0} \frac{\sin 5x - \sin 3x}{\sin x} =$ _____	
3)	$\frac{d}{dx} \left( \frac{x}{\log x} \right) =$ _____	
4)	The acceleration of a moving particle whose time equation is given by $x = 3t^2 + 2t - 5$ is ____.	
5)	Area under the curve $y=2+x$ and x-axis is _____.	
Q4.	Attempt any six questions:	5x6
1)	Find the value of x if $\begin{vmatrix} x & 2 & -1 \\ 2 & 5 & x \\ -1 & 2 & x \end{vmatrix} = 0$	
2)	If $\sin y = x \sin(a+y)$ Prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$	
3)	Find the equation of the normal to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at (1,3).	
4)	Evaluate $\int \log(1+x^2) dx$	
5)	Find the volume generated by the revolution of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about the x-axis.	
6)	Solve the differential equation $(xy^2 + x) \frac{dx}{dy} = yx^2 - y$	
7)	Evaluate $\int_{-3}^3 x^4 dx$ by Simpson's Rule taking seven equidistant ordinates.	
8)	The probability of a horse A winning the race is $1/4$ and the probability of the horse B winning the race is $1/3$ . Find the probability that one of the horse wins the race.	
Q5.	Attempt all questions:	10x3
1)	Find the maximum and minimum values of the function $f(x) = x^4 - 6x^2 + 8x + 11$	
<b>OR</b>	Calculate the median and standard deviation from the following data:	
	Class internal 1-10 11-20 21-30 31-40 41-50 51-60 f                 3      16      26      31      16      8	
2)	Using Matrix method solve the following system of equations: $x-y+z=4$ $x-2y-2z=9$ $2x+y+3z=1$	
<b>OR</b>	Find $dy/dx$ , if $x^y + y^x = 2$	
3)	Integrate the following: a) $\int \frac{dx}{x(x^4+1)}$ b) $\int \frac{dx}{5+4 \cos x}$	
<b>OR</b>	Prove that $\int_0^a x^2 (a^2 - x^2)^{3/2} dx = \frac{\pi a^6}{32}$	

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**APPLIED MATHEMATICS-II**2<sup>nd</sup> Exam/Common/2251/5422/Dec'11

M. Marks: 75

Duration : 2½ Hrs.

- 1) If A is a matrix of order 3 x 5, then each row of A has  
 (a) 3 elements  
 (b) 5 elements  
 (c) 8 elements  
 (d) 2 elements

2) If  $\begin{bmatrix} 5 & k+2 \\ k+1 & -2 \end{bmatrix} = \begin{bmatrix} k+3 & 0 \\ 3 & k \end{bmatrix}$

then k =

- (a) 0 (b) 2  
 (c) -2 (d) 1

- 3) If  $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$  is symmetric, then x =  
 (a) 3 (b) 5  
 (c) 2 (d) 4

4)  $\begin{bmatrix} x & 4 & y+z \\ y & 4 & z+x \\ z & 4 & x+y \end{bmatrix} =$   
 (a) 4 (b) x + y + z  
 (c) xyz (d) 0

- 5) If

$$\begin{vmatrix} 4 & 1 \\ 2 & 1 \end{vmatrix}^2 = \begin{vmatrix} 3 & 2 \\ 1 & x \end{vmatrix} - \begin{vmatrix} x & 3 \\ -2 & 1 \end{vmatrix} \text{ then}$$

- x =  
 (a) 6 (b) 7  
 (c) 8 (d) 9

- 6) If  $A = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$  then  $A^{-1}$  =

(a)  $\begin{bmatrix} 1 & -2 \\ -3 & 5 \end{bmatrix}$

(b)  $\begin{bmatrix} -1 & 2 \\ 3 & -5 \end{bmatrix}$

(c)  $\begin{bmatrix} -1 & -2 \\ -3 & -5 \end{bmatrix}$

(d)  $\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$

- 7) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  then  $A^2$  =

(a)  $\begin{bmatrix} 9 & 1 \\ 1 & 4 \end{bmatrix}$

(b)  $\begin{bmatrix} 8 & -5 \\ -5 & 3 \end{bmatrix}$

(c)  $\begin{bmatrix} 8 & 5 \\ 5 & -3 \end{bmatrix}$

(d)  $\begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$

8)  $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix} =$

- (a) x + y (b) xy  
 (c) x-y (d) 1+x+y

9) If  $U = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  then the value of k

- so that  $U^2 = 8U + kI$  is  
 (a) k=7 (b) k=-7  
 (c) k=0 (d) 1

10) If  $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$  then x =  
 (a) -9 (b) 2  
 (c) 7 (d) -9, 2, 7

11)  $\lim_{x \rightarrow 0} \frac{\sin x - x}{x} =$   
 (a) 1 (b) -1  
 (c) 0 (d) 2

12)  $\lim_{x \rightarrow 0} \frac{(1+x)^2 - 1}{x} =$   
 (a) n-2 (b) n-1  
 (c) n (d) 1

13)  $\lim_{x \rightarrow 1} \frac{\log x}{x-1} =$

- (a) 0 (b) 1  
 (c) 1/2 (d) 2

14) The maximum value of  $3 \sin x$  is  
 (a) 1 (b) 2  
 (c) -1 (d) 3

15) If  $y = e^{2x}$  then  $\frac{d^3 y}{dx^3} =$

- (a)  $8e^{2x}$  (b)  $2e^{2x}$   
 (c)  $4e^{2x}$  (d)  $e^{2x}$

16) If  $Y = \log(x^2)$  then  $dy/dx =$   
 (a)  $2\log x$  (b)  $2x$   
 (c)  $\log 2x$  (d)  $2/x$

17) If  $xy = c^2$ , then  $dy/dx =$   
 (a)  $-x/y$  (b)  $-y/x$   
 (c)  $x/y$  (d)  $y/x$

18)  $\frac{d}{dx} \frac{1}{x^6} =$   
 (a)  $-6x^5$  (b)  $-6x^{-6}$   
 (c)  $6x^{-6}$  (d)  $-6x^{-7}$

19) If  $y = \sin(\cos x)$  then  
 $\frac{d^2 y}{dx^2}$  at  $x = \frac{\pi}{2}$  is  
 (a) 1 (b) -1  
 (c) 2 (d) 0

20) The equation of normal to the curve  $y = x^2$  at (0,0) is  
 (a) x=0 (b) y=0  
 (c) x=y (d) x=2y

21) The derivative of  $x^6$  w.r.t  $x^3$  is  
 (a)  $6x^6$  (b)  $-2x^3$   
 (c)  $2x^3$  (d)  $-6x^6$

22)  $\frac{d}{dx} \cos^{-1}(\sin x) =$   
 (a) 1 (b) -1  
 (c) 2 (d) -2

23) If  $x = at^2$ ,  $y = 4$  at then  $\frac{dy}{dx} =$

- (a)  $2t$  (b)  $\frac{2}{t}$   
 (c)  $-2t$  (d)  $\frac{-2}{t}$

24) The function  $\frac{\log x}{x}$  has its maximum value at  $x =$   
 (a) 1 (b) e  
 (c)  $\frac{1}{e}$  (d)  $\frac{2}{e}$

25) If  $\sqrt{x} + \sqrt{y} = 1$  then  $\frac{dy}{dx}$  at  $(1/4, 1/4)$  is

- (a)  $\frac{1}{2}$
- (b) 1
- (c) -1
- (d) 2

26) The derivative of  $\cos^{-1}(2x^2-1)$  w.r.t  $\cos^{-1}x$  is

- (a) 2
- (b)  $\frac{1}{2\sqrt{1-x^2}}$
- (c)  $\frac{2}{x}$
- (d)  $1-x^2$

27) The tangent to the curve  $y=e^{2x}$  at the point  $(0,1)$  meets X-axis at

- (a)  $(0,2)$
- (b)  $(2,0)$
- (c)  $(-1/2,0)$
- (d)  $(0,1)$

28) The equation of the normal to the curve  $y=x(2-x)$  at the point  $(2,0)$  is

- (a)  $x-2y=2$
- (b)  $x-2y+2=0$
- (c)  $2x+y=4$
- (d)  $2x+y+4=0$

29) The point on the curve  $y^2=x$  where the tangent makes angle of  $45^\circ$  with x-axis is

- (a)  $\left(\frac{1}{2}, \frac{1}{4}\right)$
- (b)  $\left(\frac{1}{4}, \frac{1}{2}\right)$
- (c)  $(4,2)$
- (d)  $(1,1)$

30) The function  $f(x)=K\sin x + 1/3 \sin 3x$  has maximum value at

$$x = \frac{\pi}{3}. \text{ Then } K =$$

- (a) 3
- (b)  $1/3$
- (c) 2
- (d)  $1/2$

31) The maximum value of  $xy$  subject to  $x + y=8$  is

- (a) 28
- (b) 24
- (c) 20
- (d) 16

32) If  $x=e^y$  then  $\frac{dy}{dx}$

- (a)  $1/x$
- (b)  $e^y$
- (c)  $e^x$
- (d)  $\log x$

33) The radius of a sphere is found to be 20cm with a possible error of 2 cm. Then % error in its surface area is

- (a) 10
- (b) 20
- (c) 30
- (d) 40

34) The instantaneous rate of change for the function  $f(t) = te^t + 4$  at  $t=0$  is

- (a) 9
- (b) 0
- (c) 1
- (d) 4

35) The maximum value of  $x^3-3x+2$  occurs at  $x=$

- (a) -2
- (b) -1
- (c) 1
- (d) 2

36)  $\int \sin 2x dx =$

- (a)  $\cos 2x$
- (b)  $2\cos 2x$
- (c)  $\frac{1}{2} \cos 2x$
- (d)  $-\frac{1}{2} \cos 2x$

37)  $\int \frac{2}{\cos^2 x} dx =$

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

38)  $\int \log x dx =$

- (a)  $x\log x - x$
- (b)  $x\log x + x$
- (c)  $-x\log x - x$
- (d)  $1/x$

39)  $\int \frac{1}{x \log x} dx =$

- (a)  $\log x$
- (b)  $\log(\log x)$
- (c)  $\log\left(\frac{1}{\log x}\right)$
- (d)  $1/\log x$

40) If  $\int \frac{2^{1/x}}{x^2} dx = k \cdot 2^{1/x}$  then  $k =$

- (a) -1
- (b)  $-\log 2$
- (c)  $\frac{-1}{\log 2}$
- (d)  $1/2$

41)  $\int \cot^2 x dx =$

- (a)  $-\cot x - x$
- (b)  $-\cot x + x$
- (c)  $\cot x$
- (d)  $\tan x$

42)  $\int e^x (x^3 + 3x^2) dx =$

- (a)  $e^x \cdot x^2$
- (b)  $e^x \cdot x^3$
- (c)  $\frac{e^x}{x^2}$
- (d)  $\frac{e^x}{x^3}$

43)  $\int \frac{dx}{x(x-1)} =$

- (a)  $\log \frac{x-1}{x}$
- (b)  $\log \frac{x}{x-1}$
- (c)  $-\log \frac{x-1}{x}$
- (d)  $\log(x-1)$

44)  $\int_0^{\pi/2} \cos^6 x dx =$

- (a) 0
- (b) 1
- (c)  $5/32$
- (d)  $\frac{5\pi}{32}$

45)  $\int \sqrt{1-\cos 2x} dx =$

- (a)  $\sqrt{2} \cos x$
- (b)  $-\sqrt{2} \cos x$
- (c)  $\sqrt{2} \sin x$
- (d)  $\sin x$

46)  $\int_1^{\sqrt{3}} \frac{dx}{1+x^2} =$

- (a)  $\frac{\pi}{2}$
- (b)  $\frac{2\pi}{3}$
- (c)  $\frac{\pi}{6}$
- (d)  $\frac{\pi}{12}$

47)  $\int_0^{\pi/2} \frac{dx}{1+\sin x} =$

- (a) 0
- (b)  $1/2$
- (c) 1
- (d)  $3/2$

48)  $\int_0^{\pi/2} e^x (\sin x + \cos x) dx =$

- (a) 1
- (b)  $e^{\pi/4}$
- (c)  $e^\pi$
- (d)  $e^{\pi/2}$

49) The area covered by the curve  $y^2=x$  and the lines  $y=4$  and  $y$ -axis is  
 (a)  $16/3$       (b)  $64/3$   
 (c)  $\frac{7}{\sqrt{2}}$       (d) 64

50) Area bounded by the curves  $x=1$ ,  $x=3$ ,  $xy=1$  and  $x$ -axis is  
 (a) Log2      (b) Log3  
 (c) Log4      (d) Log5

51)  $\int_0^\pi \cos 3x \sin 2x \, dx =$   
 (a) 0      (b)  $-4/5$   
 (c)  $5/4$       (d) 1

52) The volume of revolution about  $x$ -axis of the parabola  $y^2=4x$  bounded by  $x=1$  is  
 (a)  $2\pi$       (b)  $3\pi$   
 (c)  $4\pi$       (d)  $8\pi$

53) Simpson's rule for area is applicable if number of intervals is  
 (a) Even      (b) Odd  
 (c) both      (d) none

54) Mean value of  $x^2$  over the range from  $x=1$  to  $x=4$  is  
 (a) 5      (b) 6  
 (c) 7      (d) 8

55) For calculating  $\int_0^{10} x^2 \, dx$  by using trapezoidal rule with eleven ordinates the value of  $h$  =  
 (a) 4      (b) 2  
 (c) 3      (d) 1

56)  $\int_0^{\pi/2} \sin^4 x \cos^2 x \, dx =$   
 (a)  $\pi/4$       (b)  $\pi/8$   
 (c)  $\pi/16$       (d)  $\pi/32$

57)  $\int_{-a}^a f(x) \, dx = 0$  if  $f(x)$  is  
 (a) Even      (b) odd  
 (c) both      (d) none

58)  $\int_0^k \frac{1}{2+8x^2} \, dx = \pi/16$  then  $k =$   
 (a) 1      (b)  $1/2$   
 (c)  $1/4$       (d)  $1/5$

59) If  $\int x^6 \sin(5x^7) \, dx = k/5 \cos(5x^7)$  then  $k =$   
 (a) 7      (b) -7  
 (c)  $1/7$       (d)  $-1/7$

60)  $\int \frac{e^x}{e^x + 1} \, dx =$   
 (a)  $X + \log(x^2 + 1)$   
 (b)  $e^x$   
 (c)  $e^x + 1$   
 (d) none

61)  $\int \frac{x}{\cos^2 x} \, dx =$   
 (a) Log(cosx)      (b)  $x \tan x$   
 (c) cotx      (d) none

62) Volume generated by revolving the ellipse  $9x^2 + 16y^2 = 144$  about the major axis is  
 (a)  $12\pi$       (b)  $24\pi$   
 (c)  $48\pi$       (d)  $96\pi$

63)  $\int \frac{1}{x^2 - 1} \, dx =$   
 (a)  $\log \left| \frac{x-1}{x+1} \right|$   
 (b)  $\log \left| \frac{x+1}{x-1} \right|$   
 (c)  $\frac{1}{2} \log \left| \frac{x-1}{x+1} \right|$   
 (d) log 2

64) The probability that a leap year selected at random contains 53 Sundays is  
 (a)  $1/7$       (b)  $2/7$   
 (c)  $3/7$       (d)  $4/7$

65) Two dice are thrown simultaneously. The probability of obtaining a total score of 5 is  
 (a)  $1/18$       (b)  $1/12$   
 (c)  $1/9$       (d)  $1/8$

66) The probability that the three cards drawn from a pack of 52 cards all are red is  
 (a)  $2/17$       (b)  $3/17$   
 (c)  $2/19$       (d)  $1/17$

67) Mode is  
 (a) Least frequent value  
 (b) Middle most value  
 (c) Most frequent value  
 (d) None of these

68) The probability of throwing a number greater than 2 with a fair dice is  
 (a)  $3/5$       (b)  $2/3$   
 (c)  $2/5$       (d)  $1/3$

69) The mean of five numbers is 18. If one number is excluded then mean is 16. The excluded number is  
 (a) 26      (b) 25  
 (c) 24      (d) 23

70) The medium of 10, 14, 11, 9, 8, 12, 6 is  
 (a) 10      (b) 12  
 (c) 14      (d) 11

71) The mean of absolute derivation from an average is called  
 (a) S.D      (b) M.D  
 (c) Variance      (d) none

72) The general solution of the differential equation  $\frac{dy}{dx} = \frac{x^2}{y^2}$  is  
 (a)  $x^3 - y^3 = C$       (b)  $x^3 + y^3 = C$   
 (c)  $y^3 - x^3 = C$       (d) none

73) The degree of the differential equation  $\frac{d^2y}{dx^2} + 5 \left( \frac{dy}{dx} \right)^3 + 4 = 0$  is  
 (a) 3      (b) 2  
 (c) 1      (d) 4

74) The order of the differential equation  $\frac{d^2y}{dx^2} - 5 \left( \frac{dy}{dx} \right) + 6y = 3$  is  
 (a) 2      (b) 1  
 (c) 6      (d) 0

75) Solution of  $dy/dx = e^{x+y}$  is  
 (a)  $e^y = e^x + c$   
 (b)  $e^y = -e^x + c$   
 (c)  $-e^{-y} = -e^x + c$   
 (d) none

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1) The derivative of $x^6$ w.r.t $x^3$ is (a) $6x^6$ (b) $-2x^3$ (c) $2x^3$ (d) $-6x^6$	9) The point on the curve $y^2=x$ where the tangent makes angle of $45^\circ$ with x-axis is (a) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (b) $\left(\frac{1}{4}, \frac{1}{2}\right)$ (c) (4,2)      (d) (1,1)	17) $\int \frac{2}{\cos^2 x} dx =$ (a) $2\tan x$ (b) $2\cot x$ (c) $2\sin x$ (d) $2\cos x$
2) $\frac{d}{dx} \cos^{-1}(\sin x) =$ (a) 1      (b) -1 (c) 2      (d) -2	10) The function $f(x) = K \sin x + \frac{1}{3} \sin 3x$ has maximum value at $x = \frac{\pi}{3}$ . Then $K =$ (a) 3      (b) $\frac{1}{3}$ (c) 2      (d) $\frac{1}{2}$	18) $\int \log x dx =$ (a) $x \log x - x$ (b) $x \log x + x$ (c) $-x \log x - x$ (d) $1/x$
3) If $x=at^2$ , $y=4$ at then $\frac{dy}{dx} =$ (a) $2t$ (b) $\frac{2}{t}$ (c) $-2t$ (d) $\frac{-2}{t}$	11) The maximum value of $xy$ subject to $x+y=8$ is (a) 28      (b) 24 (c) 20      (d) 16	19) $\int \frac{1}{x \log x} dx =$ (a) $\log x$ (b) $\log(\log x)$ (c) $\log\left(\frac{1}{\log x}\right)$ (d) $1/\log x$
4) The function $\frac{\log x}{x}$ has its maximum value at $x=$ (a) 1      (b) e (c) $\frac{1}{e}$ (d) $\frac{2}{e}$	12) If $x=e^y$ then $\frac{dy}{dx}$ (a) $1/x$ (b) $e^y$ (c) $e^x$ (d) $\log x$	20) If $\int \frac{2^{1/x}}{x^2} dx = k \cdot 2^{1/x}$ then $k =$ (a) -1      (b) -log 2 (c) $\frac{-1}{\log 2}$ (d) 1/2
5) If $\sqrt{x} + \sqrt{y} = 1$ then $\frac{dy}{dx}$ at $(1/4, 1/4)$ is (a) $\frac{1}{2}$ (b) 1 (c) -1      (d) 2	13) The radius of a sphere is found to be 20cm with a possible error of 2 cm. Then % error in its surface area is (a) 10      (b) 20 (c) 30      (d) 40	21) $\int \cot^2 x dx =$ (a) $-\cot x - x$ (b) $-\cot x + x$ (c) $\cot x$ (d) $\tan x$
6) The derivative of $\cos^{-1}(2x^2-1)$ w.r.t $\cos^{-1}x$ is (a) 2      (b) $\frac{1}{2\sqrt{1-x^2}}$ (c) $\frac{2}{x}$ (d) $1-x^2$	14) The instantaneous rate of change for the function $f(t) = te^t + 4$ at $t=0$ is (a) 9      (b) 0 (c) 1      (d) 4	22) $\int e^x (x^3+3x^2) dx =$ (a) $e^x \cdot x^2$ (b) $e^x \cdot x^3$ (c) $\frac{e^x}{x^2}$ (d) $\frac{e^x}{x^3}$
7) The tangent to the curve $y=e^{2x}$ at the point (0,1) meets X-axis at (a) (0,2)      (b) (2,0) (c) (-1/2,0)      (d) (0,1)	15) The maximum value of $x^3-3x+2$ occurs at $x=$ (a) -2      (b) -1 (c) 1      (d) 2	16) $\int \sin 2x dx =$ (a) $\cos 2x$ (b) $2\cos 2x$ (c) $\frac{1}{2} \cos 2x$ (d) $\frac{-1}{2} \cos 2x$
8) The equation of the normal to the curve $y=x(2-x)$ at the point (2,0) is (a) $x-2y=2$ (b) $x-2y+2=0$ (c) $2x+y=4$ (d) $2x+y+4=0$	23) $\int \frac{dx}{x(x-1)} =$ (a) $\log \frac{x-1}{x}$ (b) $\log \frac{x}{x-1}$	

- |  |  |  |
|--|--|--|
| (c) $-\log \frac{x-1}{x}$  | 32) The volume of revolution about x-axis of the parabola $y^2=4x$ bounded by $x=1$ is<br>(a) $2\pi$ (b) $3\pi$<br>(c) $4\pi$ (d) $8\pi$         | 42) Volume generated by revolving the ellipse $9x^2 + 16y^2=144$ about the major axis is<br>(a) $12\pi$ (b) $24\pi$<br>(c) $48\pi$ (d) $96\pi$   |
| 24) $\int_0^{\pi/2} \cos^6 x dx =$<br>(a) 0      (b) 1<br>(c) $5/32$ (d) $\frac{5\pi}{32}$   | 33) Simpson's rule for area is applicable if number of intervals is<br>(a) Even      (b) Odd<br>(c) both      (d) none                           | 43) $\int \frac{1}{x^2-1} dx =$<br>(a) $\log \left  \frac{x-1}{x+1} \right $<br>(b) $\log \left  \frac{x+1}{x-1} \right $<br>(c) $\frac{1}{2} \log \left  \frac{x-1}{x+1} \right $<br>(d) $\log 2$ |
| 25) $\sqrt{1-\cos 2x} dx =$<br>(a) $\sqrt{2} \cos x$<br>(b) $-\sqrt{2} \cos x$<br>(c) $\sqrt{2} \sin x$<br>(d) $\sin x$                    | 34) Mean value of $x^2$ over the range from $x=1$ to $x=4$ is<br>(a) 5      (b) 6<br>(c) 7      (d) 8  | 44) The probability that a leap year selected at random contains 53 Sundays is<br>(a) $1/7$ (b) $2/7$<br>(c) $3/7$ (d) $4/7$   |
| 26) $\int_1^{\sqrt{3}} \frac{dx}{1+x^2} =$<br>(a) $\frac{\pi}{2}$ (b) $\frac{2\pi}{3}$<br>(c) $\frac{\pi}{6}$ (d) $\frac{\pi}{12}$         | 35) For calculating $\int_0^{10} x^2$ by using trapezoidal rule with eleven ordinates the value of $h =$<br>(a) 4      (b) 2<br>(c) 3      (d) 1 | 45) Two dice are thrown simultaneously. The probability of obtaining a total score of 5 is<br>(a) $1/18$ (b) $1/12$<br>(c) $1/9$ (d) $1/8$   |
| 27) $\int_0^{\pi/2} \frac{dx}{1+\sin x} =$<br>(a) 0      (b) $1/2$<br>(c) 1      (d) $3/2$   | 36) $\int_0^{\pi/2} \sin^4 x \cos^2 x dx =$<br>(a) $\pi/4$ (b) $\pi/8$<br>(c) $\pi/16$ (d) $\pi/32$  | 46) The probability that the three cards drawn from a pack of 52 cards all are red is<br>(a) $2/17$ (b) $3/17$<br>(c) $2/19$ (d) $1/17$  |
| 28) $\int_0^{\pi/2} e^x (\sin x + \cos x) dx =$<br>(a) 1      (b) $e^{\pi/4}$<br>(c) $e^\pi$ (d) $e^{\pi/2}$                               | 37) $\int_{-a}^a f(x) dx = 0$ if $f(x)$ is<br>(a) Even      (b) odd<br>(c) both      (d) none  | 47) Mode is<br>(a) Least frequent value<br>(b) Middle most value<br>(c) Most frequent value<br>(d) None of these   |
| 29) The area covered by the curve $y^2=x$ and the lines $y=4$ and $y$ -axis is<br>(a) $16/3$ (b) $64/3$<br>(c) $\frac{7}{\sqrt{2}}$ (d) 64 | 38) $\int_0^k \frac{1}{2+8x^2} dx = \pi/16$ then $k =$<br>(a) 1      (b) $1/2$<br>(c) $1/4$ (d) $1/5$  | 48) The probability of throwing a number greater than 2 with a fair dice is<br>(a) $3/5$ (b) $2/3$<br>(c) $2/5$ (d) $1/3$  |
| 30) Area bounded by the curves $x=1$ , $x=3$ , $xy=1$ and $x$ -axis is<br>(a) Log2      (b) Log3<br>(c) Log4      (d) Log5                 | 39) If $\int x^6 \sin(5x^7) dx =$<br>$k/5 \cos(5x^7)$ then $k =$<br>(a) 7      (b) -7<br>(c) $1/7$ (d) $-1/7$                                    | 49) The mean of five numbers is 18. If one number is excluded then mean is 16. The excluded number is<br>(a) 26      (b) 25<br>(c) 24      (d) 23  |
| 31) $\int_0^{\pi} \cos 3x \sin 2x dx =$<br>(a) 0      (b) $-4/5$<br>(c) $5/4$ (d) 1  | 40) $\int \frac{e^x}{e^x + 1} dx =$<br>(a) $X + \log(x^2 + 1)$<br>(b) $e^x$<br>(c) $e^x + 1$<br>(d) none   | 50) The medium of 10, 14, 11, 9, 8, 12, 6 is<br>(a) 10      (b) 12<br>(c) 14      (d) 11   |
| 41) $\int \frac{x}{\cos^2 x} dx =$<br>(a) Log(cos x) (b) $x \tan x$<br>(c) cot x      (d) none   |  |  |

- 51) The mean of absolute derivation from an average is called  
 (a) S.D      (b) M.D  
 (c) Variance    (d) none

- 52) The general solution of the differential equation  $\frac{dy}{dx} = \frac{x^2}{y^2}$  is  
 (a)  $x^3 - y^3 = C$     (b)  $x^3 + y^3 = C$   
 (c)  $y^3 - x^3 = C$     (d) none

- 53) The degree of the differential equation  $\frac{d^2y}{dx^2} + 5\left(\frac{dy}{dx}\right)^3 + 4 = 0$  is  
 (a) 3      (b) 2  
 (c) 1      (d) 4

- 54) The order of the differential equation  $\frac{d^2y}{dx^2} - 5\left(\frac{dy}{dx}\right) + 6y = 3$  is  
 (a) 2      (b) 1  
 (c) 6      (d) 0

- 55) Solution of  $dy/dx = e^{x+y}$  is  
 (a)  $e^y = e^x + c$   
 (b)  $e^y = -e^x + c$   
 (c)  $-e^{-y} = -e^x + c$   
 (d) none

- 56) If A is a matrix of order  $3 \times 5$ , then each row of A has  
 (a) 3 elements  
 (b) 5 elements  
 (c) 8 elements  
 (d) 2 elements

- 57) If  $\begin{bmatrix} 5 & k+2 \\ k+1 & -2 \end{bmatrix} = \begin{bmatrix} k+3 & 0 \\ 3 & k \end{bmatrix}$   
 then  $k =$   
 (a) 0      (b) 2  
 (c) -2      (d) 1

- 58) If  $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$  is symmetric, then  $x =$   
 (a) 3      (b) 5  
 (c) 2      (d) 4

- 59)  $\begin{bmatrix} x & 4 & y+z \\ y & 4 & z+x \\ z & 4 & x+y \end{bmatrix} =$   
 (a) 4      (b)  $x + y + z$   
 (c)  $xyz$       (d) 0

- 60) If

$$\begin{vmatrix} 4 & 1 \\ 2 & 1 \end{vmatrix}^2 = \begin{vmatrix} 3 & 2 \\ 1 & x \end{vmatrix} - \begin{vmatrix} x & 3 \\ -2 & 1 \end{vmatrix} \text{ then}$$

$x =$

- (a) 6      (b) 7  
 (c) 8      (d) 9

- 61) If  $A = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$  then  $A^{-1} =$

- (a)  $\begin{bmatrix} 1 & -2 \\ -3 & 5 \end{bmatrix}$   
 (b)  $\begin{bmatrix} -1 & 2 \\ 3 & -5 \end{bmatrix}$   
 (c)  $\begin{bmatrix} -1 & -2 \\ -3 & -5 \end{bmatrix}$   
 (d)  $\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$

- 62) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  then  $A^2 =$

- (a)  $\begin{bmatrix} 9 & 1 \\ 1 & 4 \end{bmatrix}$   
 (b)  $\begin{bmatrix} 8 & -5 \\ -5 & 3 \end{bmatrix}$   
 (c)  $\begin{bmatrix} 8 & 5 \\ 5 & -3 \end{bmatrix}$   
 (d)  $\begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$

- 63)  $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix} =$

- (a)  $x + y$   
 (b)  $xy$   
 (c)  $x-y$   
 (d)  $1+x+y$

- 64) If  $U = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I =$

- $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  then the value of  $k$   
 so that  $U^2 = 8U + kI$  is  
 (a)  $k=7$       (b)  $k=-7$   
 (c)  $k=0$       (d) 1

- 65) If  $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$  then  $x =$

- (a) -9      (b) 2  
 (c) 7      (d) -9, 2, 7

- 66)  $\lim_{x \rightarrow 0} \frac{\sin x - x}{x} =$

- (a) 1      (b) -1  
 (c) 0      (d) 2

- 67)  $\lim_{x \rightarrow 0} \frac{(1+x)^2 - 1}{x} =$

- (a)  $n-2$       (b)  $n-1$   
 (c)  $n$       (d) 1

- 68)  $\lim_{x \rightarrow 1} \frac{\log x}{x-1} =$

- (a) 0      (b) 1  
 (c)  $1/2$       (d) 2

- 69) The maximum value of  $3 \sin x$  is

- (a) 1      (b) 2  
 (c) -1      (d) 3

- 70) If  $y = e^{2x}$  then  $\frac{d^3 y}{dx^3} =$

- (a)  $8e^{2x}$       (b)  $2e^{2x}$   
 (c)  $4e^{2x}$       (d)  $e^{2x}$

- 71) If  $Y = \log(x^2)$  then  $dy/dx =$

- (a)  $2\log x$       (b)  $2x$   
 (c)  $\log 2x$       (d)  $2/x$

- 72) If  $xy = c^2$ , then  $dy/dx =$

- (a)  $-x/y$       (b)  $-y/x$   
 (c)  $x/y$       (d)  $y/x$

- 73)  $\frac{d}{dx} \frac{1}{x^6} =$

- (a)  $-6x^5$       (b)  $-6x^{-6}$   
 (c)  $6x^{-6}$       (d)  $-6x^{-7}$

- 74) If  $y = \sin(\cos x)$  then

- $\frac{d^2 y}{dx^2}$  at  $x = \frac{\pi}{2}$  is

- (a) 1      (b) -1  
 (c) 2      (d) 0

- 75) The equation of normal to the curve  $y = x^2$  at  $(0,0)$  is

- (a)  $x=0$       (b)  $y=0$   
 (c)  $x=y$       (d)  $x=2y$

S.B. Roll No. \_\_\_\_\_

**APPLIED MATHEMATICS-II**2<sup>nd</sup> Exam/Common/2251/5422/Dec'11

M. Marks: 75

Duration : 2½ Hrs.

1) $\int \cot^2 x \, dx =$ (a) $-\cot x - x$ (b) $-\cot x + x$ (c) $\cot x$ (d) $\tan x$	7) $\int_0^{\pi/2} \frac{dx}{1 + \sin x} =$ (a) 0 (b) $\frac{1}{2}$ (c) 1 (d) $\frac{3}{2}$	(a) $\pi/4$ (b) $\pi/8$ (c) $\pi/16$ (d) $\pi/32$
2) $\int e^x (x^3 + 3x^2) dx =$ (a) $e^x \cdot x^2$ (b) $e^x \cdot x^3$  (c) $\frac{e^x}{x^2}$ (d) $\frac{e^x}{x^3}$	8) $\int_0^{\pi/2} e^x (\sin x + \cos x) dx =$ (a) 1 (b) $e^{\pi/4}$ (c) $e^\pi$ (d) $e^{\pi/2}$	17) $\int_{-a}^a f(x) dx = 0$ if $f(x)$ is (a) Even (b) odd (c) both (d) none
3) $\int \frac{dx}{x(x-1)} =$  (a) $\log \frac{x-1}{x}$  (b) $\log \frac{x}{x-1}$  (c) $-\log \frac{x-1}{x}$ (d) $\log(x-1)$	9) The area covered by the curve $y^2 = x$ and the lines $y=4$ and $y$ -axis is (a) $16/3$ (b) $64/3$  (c) $\frac{7}{\sqrt{2}}$ (d) 64	18) $\int_0^k \frac{1}{2+8x^2} dx = \pi/16$ then $k =$ (a) 1 (b) $1/2$ (c) $1/4$ (d) $1/5$
4) $\int_0^{\pi/2} \cos^6 x \, dx =$ (a) 0 (b) 1  (c) $5/32$ (d) $\frac{5\pi}{32}$	10) Area bounded by the curves $x=1$ , $x=3$ , $xy=1$ and $x$ -axis is (a) Log2 (b) Log3 (c) Log4 (d) Log5	19) If $\int x^6 \sin(5x^7) dx = k/5 \cos(5x^7)$ then $k =$ (a) 7 (b) -7 (c) $1/7$ (d) $-1/7$
5) $\int \sqrt{1 - \cos 2x} \, dx =$ (a) $\sqrt{2} \cos x$ (b) $-\sqrt{2} \cos x$ (c) $\sqrt{2} \sin x$ (d) $\sin x$	11) $\int_0^{\pi} \cos 3x \sin 2x \, dx =$ (a) 0 (b) $-4/5$ (c) $5/4$ (d) 1	20) $\int \frac{e^x}{e^x + 1} dx =$ (a) $X + \log(x^2 + 1)$ (b) $e^x$ (c) $e^x + 1$ (d) none
6) $\int_1^{\sqrt{3}} \frac{dx}{1+x^2} =$  (a) $\frac{\pi}{2}$ (b) $\frac{2\pi}{3}$  (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{12}$	12) The volume of revolution about $x$ -axis of the parabola $y^2 = 4x$ bounded by $x=1$ is (a) $2\pi$ (b) $3\pi$ (c) $4\pi$ (d) $8\pi$	21) $\int \frac{x}{\cos^2 x} dx =$ (a) Log(cosx) (b) $x \tan x$ (c) cotx (d) none
	13) Simpson's rule for area is applicable if number of intervals is (a) Even (b) Odd (c) both (d) none	22) Volume generated by revolving the ellipse $9x^2 + 16y^2 = 144$ about the major axis is (a) $12\pi$ (b) $24\pi$ (c) $48\pi$ (d) $96\pi$
	14) Mean value of $x^2$ over the range from $x=1$ to $x=4$ is (a) 5 (b) 6 (c) 7 (d) 8	23) $\int \frac{1}{x^2 - 1} dx =$ (a) $\log \left  \frac{x-1}{x+1} \right $  (b) $\log \left  \frac{x+1}{x-1} \right $  (c) $\frac{1}{2} \log \left  \frac{x-1}{x+1} \right $  (d) log 2
	15) For calculating $\int_0^{10} x^2$ by using trapezoidal rule with eleven ordinates the value of $h =$ (a) 4 (b) 2 (c) 3 (d) 1	
	16) $\int_0^{\pi/2} \sin^4 x \cos^2 x \, dx =$	

- 24) The probability that a leap year selected at random contains 53 Sundays is  
 (a)  $1/7$       (b)  $2/7$   
 (c)  $3/7$       (d)  $4/7$

- 25) Two dice are thrown simultaneously. The probability of obtaining a total score of 5 is  
 (a)  $1/18$       (b)  $1/12$   
 (c)  $1/9$       (d)  $1/8$

- 26) The probability that the three cards drawn from a pack of 52 cards all are red is  
 (a)  $2/17$       (b)  $3/17$   
 (c)  $2/19$       (d)  $1/17$

- 27) Mode is  
 (a) Least frequent value  
 (b) Middle most value  
 (c) Most frequent value  
 (d) None of these

- 28) The probability of throwing a number greater than 2 with a fair dice is  
 (a)  $3/5$       (b)  $2/3$   
 (c)  $2/5$       (d)  $1/3$

- 29) The mean of five numbers is 18. If one number is excluded then mean is 16. The excluded number is  
 (a) 26      (b) 25  
 (c) 24      (d) 23

- 30) The medium of 10, 14, 11, 9, 8, 12, 6 is  
 (a) 10      (b) 12  
 (c) 14      (d) 11

- 31) The mean of absolute derivation from an average is called  
 (a) S.D      (b) M.D  
 (c) Variance      (d) none

- 32) The general solution of the differential equation  $\frac{dy}{dx} = \frac{x^2}{y^2}$  is  
 (a)  $x^3 - y^3 = C$       (b)  $x^3 + y^3 = C$   
 (c)  $y^3 - x^3 = C$       (d) none

- 33) The degree of the differential equation  $\frac{d^2y}{dx^2} + 5\left(\frac{dy}{dx}\right)^3 + 4 = 0$  is  
 (a) 3      (b) 2  
 (c) 1      (d) 4

- 34) The order of the differential equation  $\frac{d^2y}{dx^2} - 5\left(\frac{dy}{dx}\right) + 6y = 3$

- is  
 (a) 2      (b) 1  
 (c) 6      (d) 0

- 35) Solution of  $dy/dx = e^{x+y}$  is  
 (a)  $e^y = e^x + c$   
 (b)  $e^y = -e^x + c$   
 (c)  $-e^{-y} = -e^x + c$   
 (d) none

- 36) If A is a matrix of order  $3 \times 5$ , then each row of A has  
 (a) 3 elements  
 (b) 5 elements  
 (c) 8 elements  
 (d) 2 elements

- 37) If  $\begin{bmatrix} 5 & k+2 \\ k+1 & -2 \end{bmatrix} = \begin{bmatrix} k+3 & 0 \\ 3 & k \end{bmatrix}$   
 then k =  
 (a) 0      (b) 2  
 (c) -2      (d) 1

- 38) If  $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$  is symmetric, then x =  
 (a) 3      (b) 5  
 (c) 2      (d) 4

- 39)  $\begin{bmatrix} x & 4 & y+z \\ y & 4 & z+x \\ z & 4 & x+y \end{bmatrix} =$   
 (a) 4      (b)  $x + y + z$   
 (c) xyz      (d) 0

- 40) If  $\begin{vmatrix} 4 & 1 \\ 2 & 1 \end{vmatrix}^2 = \begin{vmatrix} 3 & 2 \\ 1 & x \end{vmatrix} \begin{vmatrix} x & 3 \\ -2 & 1 \end{vmatrix}$  then

$$x =$$

(a) 6      (b) 7  
 (c) 8      (d) 9

- 41) If  $A = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$  then  $A^{-1} =$

- (a)  $\begin{bmatrix} 1 & -2 \\ -3 & 5 \end{bmatrix}$   
 (b)  $\begin{bmatrix} -1 & 2 \\ 3 & -5 \end{bmatrix}$   
 (c)  $\begin{bmatrix} -1 & -2 \\ -3 & -5 \end{bmatrix}$

(d)  $\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$

42) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  then  $A^2 =$

(a)  $\begin{bmatrix} 9 & 1 \\ 1 & 4 \end{bmatrix}$   
 (b)  $\begin{bmatrix} 8 & -5 \\ -5 & 3 \end{bmatrix}$

(c)  $\begin{bmatrix} 8 & 5 \\ 5 & -3 \end{bmatrix}$   
 (d)  $\begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$

43)  $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix} =$

(a)  $x + y$       (b)  $xy$   
 (c)  $x - y$       (d)  $1 + x + y$

44) If  $U = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  then the value of k

so that  $U^2 = 8U + kI$  is  
 (a)  $k=7$       (b)  $k=-7$   
 (c)  $k=0$       (d) 1

45) If  $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$  then x =  
 (a) -9      (b) 2  
 (c) 7      (d) -9, 2, 7

46)  $\lim_{x \rightarrow 0} \frac{\sin x - x}{x} =$   
 (a) 1      (b) -1  
 (c) 0      (d) 2

47)  $\lim_{x \rightarrow 0} \frac{(1+x)^2 - 1}{x} =$   
 (a)  $n-2$       (b)  $n-1$   
 (c) n      (d) 1

48)  $\lim_{x \rightarrow 1} \frac{\log x}{x-1} =$

(a) 0 (c) 1/2	(b) 1 (d) 2		
49) The maximum value of $3 \sin x$ is		60) If $\sqrt{x} + \sqrt{y} = 1$ then $\frac{dy}{dx}$ at $(1/4, 1/4)$ is	(a) 10 (c) 30
(a) 1 (c) -1	(b) 2 (d) 3	(a) $\frac{1}{2}$ (c) -1	(b) 20 (d) 40
50) If $y = e^{2x}$ then $\frac{d^3 y}{dx^3} =$		(b) 1 (d) 2	69) The instantaneous rate of change for the function $f(t) = te^t + 4$ at $t=0$ is
(a) $8e^{2x}$ (c) $4e^{2x}$	(b) $2e^{2x}$ (d) $e^{2x}$		(a) 9 (c) 1
51) If $Y = \log(x^2)$ then $dy/dx =$		61) The derivative of $\cos^{-1}(2x^2 - 1)$ w.r.t $\cos^{-1}x$ is	(b) 0 (d) 4
(a) $2\log x$ (c) $\log 2x$	(b) $2x$ (d) $2/x$	(a) 2 (c) $\frac{2}{x}$	70) The maximum value of $x^3 - 3x + 2$ occurs at $x =$
52) If $xy = c^2$ , then $dy/dx =$		(b) $\frac{1}{2\sqrt{1-x^2}}$ (d) $1-x^2$	(a) -2 (c) 1
(a) $-x/y$ (c) $x/y$	(b) $-y/x$ (d) $y/x$	62) The tangent to the curve $y = e^{2x}$ at the point $(0, 1)$ meets X-axis at	(d) 2
53) $\frac{d}{dx} \frac{1}{x^6} =$		(a) $(0, 2)$ (c) $(-1/2, 0)$	(a) $\frac{1}{2} \cos 2x$
(a) $-6x^5$ (c) $6x^{-6}$	(b) $-6x^{-6}$ (d) $-6x^{-7}$	(b) $(2, 0)$ (d) $(0, 1)$	(b) $2\cos 2x$
54) If $y = \sin(\cos x)$ then		63) The equation of the normal to the curve $y = x(2-x)$ at the point $(2, 0)$ is	(c) $\frac{-1}{2} \cos 2x$
(a) 1 (c) 2	(b) -1 (d) 0	(a) $x-2y=2$ (b) $x-2y+2=0$ (c) $2x+y=4$ (d) $2x+y+4=0$	(d) $2\cos x$
55) The equation of normal to the curve $y = x^2$ at $(0, 0)$ is		64) The point on the curve $y^2 = x$ where the tangent makes angle of $45^\circ$ with x-axis is	72) $\int \frac{2}{\cos^2 x} dx =$
(a) $x=0$ (c) $x=y$	(b) $y=0$ (d) $x=2y$	(a) $\left(\frac{1}{2}, \frac{1}{4}\right)$ (b) $\left(\frac{1}{4}, \frac{1}{2}\right)$ (c) $(4, 2)$ (d) $(1, 1)$	(a) $2\tan x$ (b) $2\cot x$ (c) $2\sin x$ (d) $2\cos x$
56) The derivative of $x^6$ w.r.t $x^3$ is		65) The function $f(x) = K \sin x + 1/3 \sin 3x$ has maximum value at	73) $\int \log x dx =$
(a) $6x^6$ (c) $2x^3$	(b) $-2x^3$ (d) $-6x^6$	$x = \frac{\pi}{3}$ . Then $K =$	(a) $x \log x - x$ (b) $x \log x + x$ (c) $-x \log x - x$ (d) $1/x$
57) $\frac{d}{dx} \cos^{-1}(\sin x) =$		(a) 3 (c) 2	74) $\int \frac{1}{x \log x} dx =$
(a) 1 (c) 2	(b) -1 (d) -2	(b) $1/3$ (d) $1/2$	(a) $\log x$ (b) $\log(\log x)$
58) If $x = at^2$ , $y = 4$ at then $\frac{dy}{dx} =$		66) The maximum value of $xy$ subject to $x + y = 8$ is	(c) $\log\left(\frac{1}{\log x}\right)$ (d) $1/\log x$
(a) $2t$ (c) $-2t$	(b) $\frac{2}{t}$ (d) $\frac{-2}{t}$	(a) 28 (c) 20	75) If $\int \frac{2^{1/x}}{x^2} dx = k \cdot 2^{1/x}$ then $k =$
59) The function $\frac{\log x}{x}$ has its maximum value at $x =$		(b) 24 (d) 16	(a) -1 (b) -log 2
(a) 1 (c) $\frac{1}{e}$	(b) $e$ (d) $\frac{2}{e}$	67) If $x = e^y$ then $\frac{dy}{dx}$	(c) $\frac{-1}{\log 2}$ (d) $1/2$
		(a) $1/x$ (c) $e^x$	
		(b) $e^y$ (d) $\log x$	
		68) The radius of a sphere is found to be 20cm with a possible error of 2 cm. Then % error in its surface area is	

S.B. Roll No. \_\_\_\_\_

**APPLIED MATHEMATICS-II**2<sup>nd</sup> Exam/Common/2251/5422/Dec'11

M. Marks: 75

Duration : 2½ Hrs.

1) $\int \frac{x}{\cos^2 x} dx =$ (a) Log(cosx) (b) x tan x (c) cot x (d) none	9) The mean of five numbers is 18. If one number is excluded then mean is 16. The excluded number is (a) 26      (b) 25 (c) 24      (d) 23	(a) 0      (b) 2 (c) -2      (d) 1  18) If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is symmetric, then $x =$ (a) 3      (b) 5 (c) 2      (d) 4
2) Volume generated by revolving the ellipse $9x^2 + 16y^2 = 144$ about the major axis is (a) $12\pi$ (b) $24\pi$ (c) $48\pi$ (d) $96\pi$	10) The medium of 10, 14, 11, 9, 8, 12, 6 is (a) 10      (b) 12 (c) 14      (d) 11	11) The mean of absolute derivation from an average is called (a) S.D      (b) M.D (c) Variance      (d) none
3) $\int \frac{1}{x^2-1} dx =$ (a) $\log \left  \frac{x-1}{x+1} \right $ (b) $\log \left  \frac{x+1}{x-1} \right $ (c) $\frac{1}{2} \log \left  \frac{x-1}{x+1} \right $ (d) log 2	12) The general solution of the differential equation $\frac{dy}{dx} = \frac{x^2}{y^2}$ is (a) $x^3 - y^3 = C$ (b) $x^3 + y^3 = C$ (c) $y^3 - x^3 = C$ (d) none	13) The degree of the differential equation $\frac{d^2y}{dx^2} + 5 \left( \frac{dy}{dx} \right)^3 + 4 = 0$ is (a) 3      (b) 2 (c) 1      (d) 4
4) The probability that a leap year selected at random contains 53 Sundays is (a) $1/7$ (b) $2/7$ (c) $3/7$ (d) $4/7$	14) The order of the differential equation $\frac{d^2y}{dx^2} - 5 \left( \frac{dy}{dx} \right) + 6y = 3$ is (a) 2      (b) 1 (c) 6      (d) 0	15) Solution of $dy/dx = e^{x+y}$ is (a) $e^y = e^x + c$ (b) $e^y = -e^x + c$ (c) $-e^{-y} = -e^x + c$ (d) none
5) Two dice are thrown simultaneously. The probability of obtaining a total score of 5 is (a) $1/18$ (b) $1/12$ (c) $1/9$ (d) $1/8$	16) If A is a matrix of order $3 \times 5$ , then each row of A has (a) 3 elements (b) 5 elements (c) 8 elements (d) 2 elements	22) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then $A^2 =$ (a) $\begin{bmatrix} 9 & 1 \\ 1 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & -5 \\ -5 & 3 \end{bmatrix}$ (c) $\begin{bmatrix} 8 & 5 \\ 5 & -3 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$
6) The probability that the three cards drawn from a pack of 52 cards all are red is (a) $2/17$ (b) $3/17$ (c) $2/19$ (d) $1/17$	17) If $\begin{bmatrix} 5 & k+2 \\ k+1 & -2 \end{bmatrix} = \begin{bmatrix} k+3 & 0 \\ 3 & k \end{bmatrix}$ then $k =$	

23)  $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix} =$

- (a)  $x + y$       (b)  $xy$   
 (c)  $x-y$       (d)  $1+x+y$

24) If  $U = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  then the value of  $k$

- so that  $U^2 = 8U + kI$  is  
 (a)  $k=7$       (b)  $k=-7$   
 (c)  $k=0$       (d)  $1$

25) If  $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$  then  $x =$   
 (a) -9      (b) 2  
 (c) 7      (d) -9, 2, 7

26)  $\lim_{x \rightarrow 0} \frac{\sin x - x}{x} =$   
 (a) 1      (b) -1  
 (c) 0      (d) 2

27)  $\lim_{x \rightarrow 0} \frac{(1+x)^2 - 1}{x} =$   
 (a)  $n-2$       (b)  $n-1$   
 (c)  $n$       (d) 1

28)  $\lim_{x \rightarrow 1} \frac{\log x}{x-1} =$   
 (a) 0      (b) 1  
 (c)  $1/2$       (d) 2

29) The maximum value of  $3 \sin x$  is  
 (a) 1      (b) 2  
 (c) -1      (d) 3

30) If  $y = e^{2x}$  then  $\frac{d^3 y}{dx^3} =$   
 (a)  $8e^{2x}$       (b)  $2e^{2x}$   
 (c)  $4e^{2x}$       (d)  $e^{2x}$

31) If  $Y = \log(x^2)$  then  $dy/dx =$   
 (a)  $2\log x$       (b)  $2x$   
 (c)  $\log 2x$       (d)  $2/x$

32) If  $xy = c^2$ , then  $dy/dx =$   
 (a)  $-x/y$       (b)  $-y/x$   
 (c)  $x/y$       (d)  $y/x$

33)  $\frac{d}{dx} \frac{1}{x^6} =$   
 (a)  $-6x^5$       (b)  $-6x^{-6}$   
 (c)  $6x^{-6}$       (d)  $-6x^{-7}$

34) If  $y = \sin(\cos x)$  then

$$\frac{d^2 y}{dx^2} \text{ at } x = \frac{\pi}{2} \text{ is}$$

(a) 1      (b) -1  
 (c) 2      (d) 0

35) The equation of normal to the curve  $y = x^2$  at  $(0,0)$  is  
 (a)  $x=0$       (b)  $y=0$   
 (c)  $x=y$       (d)  $x=2y$

36) The derivative of  $x^6$  w.r.t  $x^3$  is  
 (a)  $6x^6$       (b)  $-2x^3$   
 (c)  $2x^3$       (d)  $-6x^6$

37)  $\frac{d}{dx} \cos^{-1}(\sin x) =$   
 (a) 1      (b) -1  
 (c) 2      (d) -2

38) If  $x = at^2$ ,  $y = 4$  at then  $\frac{dy}{dx} =$   
 (a)  $2t$       (b)  $\frac{2}{t}$   
 (c)  $-2t$       (d)  $\frac{-2}{t}$

39) The function  $\frac{\log x}{x}$  has its maximum value at  $x =$   
 (a) 1      (b)  $e$   
 (c)  $\frac{1}{e}$       (d)  $\frac{2}{e}$

40) If  $\sqrt{x} + \sqrt{y} = 1$  then  $\frac{dy}{dx}$  at  $(1/4, 1/4)$  is

(a)  $\frac{1}{2}$       (b) 1  
 (c) -1      (d) 2

41) The derivative of  $\cos^{-1}(2x^2 - 1)$  w.r.t  $\cos^{-1}x$  is

(a) 2      (b)  $\frac{1}{2\sqrt{1-x^2}}$   
 (c)  $\frac{2}{x}$       (d)  $1-x^2$

42) The tangent to the curve  $y = e^{2x}$  at the point  $(0,1)$  meets X-axis at  
 (a)  $(0,2)$       (b)  $(2,0)$   
 (c)  $(-1/2,0)$       (d)  $(0,1)$

43) The equation of the normal to the curve  $y = x(2-x)$  at the point  $(2,0)$  is  
 (a)  $x-2y=2$       (b)  $x-2y+2=0$   
 (c)  $2x+y=4$       (d)  $2x+y+4=0$

44) The point on the curve  $y^2 = x$  where the tangent makes angle of  $45^\circ$  with x-axis is

(a)  $\left(\frac{1}{2}, \frac{1}{4}\right)$       (b)  $\left(\frac{1}{4}, \frac{1}{2}\right)$   
 (c)  $(4,2)$       (d)  $(1,1)$

45) The function  $f(x) = K \sin x + 1/3 \sin 3x$  has maximum value at  $x = \frac{\pi}{3}$ . Then  $K =$

(a) 3      (b)  $1/3$   
 (c) 2      (d)  $1/2$

46) The maximum value of  $xy$  subject to  $x + y = 8$  is  
 (a) 28      (b) 24  
 (c) 20      (d) 16

47) If  $x = e^y$  then  $\frac{dy}{dx}$   
 (a)  $1/x$       (b)  $e^y$   
 (c)  $e^x$       (d)  $\log x$

48) The radius of a sphere is found to be 20cm with a possible error of 2 cm. Then % error in its surface area is  
 (a) 10      (b) 20  
 (c) 30      (d) 40

49) The instantaneous rate of change for the function  $f(t) = te^t + 4$  at  $t=0$  is  
 (a) 9      (b) 0  
 (c) 1      (d) 4

50) The maximum value of  $x^3 - 3x + 2$  occurs at  $x =$   
 (a) -2      (b) -1  
 (c) 1      (d) 2

51)  $\int \sin 2x dx =$   
 (a)  $\cos 2x$       (b)  $2\cos 2x$

(c) $\frac{1}{2} \cos 2x$	(b) $\log \frac{x}{x-1}$	66) $\int_0^\pi \cos 3x \sin 2x \, dx =$ (a) 0      (b) -4/5 (c) 5/4      (d) 1
(d) $\frac{-1}{2} \cos 2x$	(c) $-\log \frac{x-1}{x}$ (d) $\log(x-1)$	67) The volume of revolution about x-axis of the parabola $y^2=4x$ bounded by $x=1$ is (a) $2\pi$ (b) $3\pi$ (c) $4\pi$ (d) $8\pi$
52) $\int \frac{2}{\cos^2 x} \, dx =$ (a) $2\tan x$ (b) $2\cot x$ (c) $2\sin x$ (d) $2\cos x$	59) $\int_0^{\pi/2} \cos^6 x \, dx =$ (a) 0      (b) 1 (c) $\frac{5}{32}$ (d) $\frac{5\pi}{32}$	68) Simpson's rule for area is applicable if number of intervals is (a) Even      (b) Odd (c) both      (d) none
53) $\int \log x \, dx =$ (a) $x \log x - x$ (b) $x \log x + x$ (c) $-x \log x - x$ (d) $1/x$	60) $\int \sqrt{1 - \cos 2x} \, dx =$ (a) $\sqrt{2} \cos x$ (b) $-\sqrt{2} \cos x$ (c) $\sqrt{2} \sin x$ (d) $\sin x$	69) Mean value of $x^2$ over the range from $x=1$ to $x=4$ is (a) 5      (b) 6 (c) 7      (d) 8
54) $\int \frac{1}{x \log x} \, dx =$ (a) $\log x$ (b) $\log(\log x)$ (c) $\log\left(\frac{1}{\log x}\right)$ (d) $1/\log x$	61) $\int_1^{\sqrt{3}} \frac{dx}{1+x^2} =$ (a) $\frac{\pi}{2}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{12}$	70) For calculating $\int_0^{10} x^2$ by using trapezoidal rule with eleven ordinates the value of $h =$ (a) 4      (b) 2 (c) 3      (d) 1
55) If $\int \frac{2^{1/x}}{x^2} \, dx = k \cdot 2^{1/x}$ then $k =$ (a) -1      (b) -log 2 (c) $\frac{-1}{\log 2}$ (d) 1/2	62) $\int_0^{\pi/2} \frac{dx}{1 + \sin x} =$ (a) 0      (b) 1/2 (c) 1      (d) 3/2	71) $\int_0^{\pi/2} \sin^4 x \cos^2 x \, dx =$ (a) $\pi/4$ (b) $\pi/8$ (c) $\pi/16$ (d) $\pi/32$
56) $\int \cot^2 x \, dx =$ (a) $-\cot x - x$ (b) $-\cot x + x$ (c) $\cot x$ (d) $\tan x$	63) $\int_0^{\pi/2} e^x (\sin x + \cos x) \, dx =$ (a) 1      (b) $e^{\pi/4}$ (c) $e^\pi$ (d) $e^{\pi/2}$	72) $\int_{-a}^a f(x) \, dx = 0$ if $f(x)$ is (a) Even      (b) odd (c) both      (d) none
57) $\int e^x (x^3 + 3x^2) \, dx =$ (a) $e^x \cdot x^2$ (b) $e^x \cdot x^3$ (c) $\frac{e^x}{x^2}$ (d) $\frac{e^x}{x^3}$	64) The area covered by the curve $y^2=x$ and the lines $y=4$ and $y$ -axis is (a) $16/3$ (b) $64/3$ (c) $\frac{7}{\sqrt{2}}$ (d) 64	73) $\int_0^k \frac{1}{2+8x^2} \, dx = \pi/16$ then $k =$ (a) 1      (b) 1/2 (c) 1/4      (d) 1/5
58) $\int \frac{dx}{x(x-1)} =$ (a) $\log \frac{x-1}{x}$	65) Area bounded by the curves $x=1$ , $x=3$ , $xy=1$ and $x$ -axis is (a) Log2 (b) Log3 (c) Log4 (d) Log5	74) If $\int x^6 \sin(5x^7) \, dx =$ $k/5 \cos(5x^7)$ then $k =$ (a) 7      (b) -7 (c) 1/7      (d) -1/7