8.	Determine the inverse of the following matrix by Gauss Jordan method $A=\begin{bmatrix}-1 & 1 & 2\\ 3 & -1 & 1\\ -1 & 3 & 4\end{bmatrix}.$	**[8]**	**CO2**
9.	Investigate the values of λ and μ so that the equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=\mu$ have **(i)** no solution, **(ii)** a unique solution and **(iii)** an infinite number of solutions.	**[8]**	**CO2**
10.	Differentiate $\tan^{-1}\left\{\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right\}$ with respect to $\cos^{-1}(x^2)$. **OR** Evaluate the integral $\int \frac{x}{x^2+x+1}\,dx.$	**[8]**	**CO3**
SECTION C (Q11 is compulsory and Q12A, Q12B have internal choice)			
11.A	If $y=x\sin(a+y)$, then prove that $\frac{dy}{dx}=\frac{\sin^2(a+y)}{\sin a}$.	**[10]**	**CO3**
11.B	A fair dice is rolled. Consider the three events $A=\{1,3,5\}$, $B=\{2,3\}$ and $C=\{2,3,4,5\}$. Determine $(i)\ P\left(\frac{A}{B}\right)$ and $P\left(\frac{B}{A}\right)$, $(ii)\ P\left(\frac{A}{C}\right)$ and $P\left(\frac{C}{A}\right)$, $(iii)\ P\left(\frac{A\cup B}{C}\right)$ and $P\left(\frac{A\cap B}{C}\right)$.	**[10]**	**CO4**
12.A	Evaluate the integral $\int \frac{1}{(x-1)^2(x+2)}\,dx.$ **OR** Evaluate the integral $\int \frac{3x+5}{x^3-x^2-x+1}\,dx.$	**[10]**	**CO3**
12.B	There are three bags: first containing 1 white, 2 red, 3 green balls; second 2 white, 3 red, 1 green balls and third 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. These are found to be one white and one red. Determine the probability that the balls so drawn came from the second bag. **OR** In a bolt factory, machines *A*, *B* and *C* manufacture 25%, 35% and 40% of the total output respectively. Of their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines *A*, *B* and *C*?	**[10]**	**CO4**

Name: **Enrolment No:**	UPES

End Semester Examination, Dec 2017
Course: MATH 1006-Mathematics

Programme: BCA
Semester: I (ODD-2017-18)
Time: 03 hrs. **Max. Marks:100**

Instructions:
Attempt all questions from **Section A** (each carrying 4 marks); attempt all questions from **Section B** (each carrying 8 marks)**;** attempt all questions from **Section C** (each carrying 20 marks)**.**

Section A
(Attempt all questions)

1.	Determine the solution of the following equation after reducing it into quadratic equation $x^{1/2}+3x^{1/4}+2=0$.	**[4]**	**CO1**
2.	Determine the value of *x*, *y*, *a* and *b* if $\begin{bmatrix} x+2y & 2x-y \\ 3a+b & a-2b \end{bmatrix}=\begin{bmatrix} 3 & 11 \\ 3 & 8 \end{bmatrix}$.	**[4]**	**CO2**
3.	If $y=e^{x+e^{x+e^{x+e^{x+......\infty}}}}$, then prove that $\frac{dy}{dx}=\frac{y}{(1-y)}$.	**[4]**	**CO3**
4.	Evaluate the following integral $\int \frac{1}{\sqrt{x^2-4x+2}}\,dx$.	**[4]**	**CO3**
5.	A dice is thrown three times. Events *A* and *B* are defined as below: *A*= Getting 4 on third dice, *B*= Getting 6 on the first and 5 on the second throw. Determine the probability of *A* given that *B* has already occurred.	**[4]**	**CO4**

SECTION B
(Q6-Q9 are compulsory and Q10 has internal choice)

6.	Prove that $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix}=abc(a-b)(b-c)(c-a)$.	**[8]**	**CO1**
7.	Prove that $\begin{vmatrix} 1 & a & a^3 \\ 1 & b & b^3 \\ 1 & c & c^3 \end{vmatrix}=(a-b)(b-c)(c-a)(a+b+c)$.	**[8]**	**CO1**

8.	Determine the inverse of the following matrix by Gauss Jordan method $A=\begin{bmatrix}1&3&3\\1&4&3\\1&3&4\end{bmatrix}$.	**[8]**	**CO2**
9.	Investigate the values of m and n so that the equations $x+2y+z=4$, $x+y+z=6$, $x-2y+mz=n$ have **(i)** no solution, **(ii)** a unique solution and **(iii)** an infinite number of solutions.	**[8]**	**CO2**
10.	Differentiate $\tan^{-1}\left\{\frac{\sqrt{1-x^2}}{x}\right\}$ with respect to $\cos^{-1}\left(2x\sqrt{1-x^2}\right)$. **OR** Evaluate the following integral $\int_0^\infty \frac{1}{(x+1)(x^2+9)}\,dx$.	**[8]**	**CO3**
SECTION C (Q11 is compulsory and Q12A, Q12B have internal choice)			
11.A	If $\tan^{-1}\left(\frac{y}{x}\right)=\log\sqrt{(x^2+y^2)}$, then prove that $\frac{dy}{dx}=\frac{x+y}{x-y}$.	**[10]**	**CO3**
11.B	Two dice are tossed once. Determine the probability of getting an even number on the first dice or a total of 8.	**[10]**	**CO4**
12.A	Evaluate the following integral $\int \frac{1}{(x+1)^2(x-2)}\,dx$. **OR** Evaluate the following integral $\int_0^\infty \frac{1}{(x^2+1)(x^2+4)}\,dx$.	**[10]**	**CO3**
12.B	A bag *A* contains 8 white and 4 black balls. A second bag *B* contains 5 white and 6 black balls. One ball is drawn at random from bag *A* and is placed in bag *B*. Now, a ball is drawn at random from bag *B*. It is found that this ball is white. Determine the probability that a black ball has been transferred from bag *A*. **OR** Four boxes *A*, *B*, *C* and *D* contain 500, 300, 200 and 100 fuses respectively. The percentages of fuses in the boxes which are defective are 3%, 2%, 1% and 0.5% respectively. One fuse is selected at random arbitrarily from one of the boxes. It is found to be a defective fuse. Determine the probability that it has come from the box *D*.	**[10]**	**CO4**