**Code: DE01 / DC01** Time: 3 Hours

**JUNE 2011** 

Student Bounty.com **Subject: MATHEMATICS -**

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

## Choose the correct or the best alternative in the following: Q.1

 $(2 \times 10)$ 

- a. How many terms are there in the sequence 3, 6, 9, 12 ....., 111?
  - (A) 34

**(B)** 36

**(C)** 37

- (**D**) 33
- b. If  $\sin A = \frac{3}{5}$  and  $\cos B = \frac{9}{41}$ ,  $0 < A < \frac{\pi}{2}$ ,  $0 < B < \frac{\pi}{2}$ , find the value of sin(A+B)
  - **(A)**  $-\frac{133}{205}$

(C)  $\frac{156}{205}$ 

- **(D)**  $\frac{-84}{205}$
- c. The area of triangle whose vertices are (6, 3), (-3,5) & (4,-2) is:
  - (A) 24.5 sq. unit

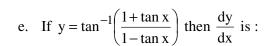
**(B)** 24 sq. unit

(C) 25.5 sq. unit

- **(D)** 25 sq unit
- d. Evaluate  $\lim_{x\to 0} \frac{\cos 2x 1}{\cos x 1}$ 
  - **(A)** 2

**(C)** 4

**(D)**  $\frac{1}{4}$ 



**(A)** 1

**(B)** -1

(C) 0

**(D)**  $\frac{1}{2}$ 

f. Evaluate 
$$\int \frac{1}{16+9x^2} dx$$

- (A)  $\frac{1}{6} \tan^{-1} \left( \frac{3x}{4} \right) + C$
- **(B)** $\frac{1}{12} \tan^{-1} \left( \frac{3x}{4} \right) + C$
- (C)  $\tan^{-1}\left(\frac{3x}{4}\right) + C$
- **(D)**  $-\frac{1}{12} \tan^{-1} \left( \frac{3x}{4} \right) + C$

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g. Evaluate 
$$\int_{0}^{1} xe^{x} dx$$

(A) 0

(**B**) -1

**(C)** 2

**(D)** 1

h. If 
$$\frac{dy}{dx} = x \log x$$
 then the value of y will be:

- (A)  $\frac{x^2}{2} \log x + \frac{1}{2} \left( \frac{x^2}{2} \right) + C$  (B)  $\frac{x^2}{2} \log x \frac{1}{2} \left( \frac{x^2}{2} \right) + C$
- (C)  $\frac{x}{2} \log x + \frac{1}{2} \left( \frac{x^2}{2} \right) + C$  (D)  $\frac{x^2}{2} \log x \frac{x^2}{2} + C$
- From a class of 32 students, 4 are to be chosen for a competition. In how many ways can this be done?
  - (A) 35960

**(B)** 35900

(C) 35940

**(D)** 35980

j. Find the equation of the line which makes intercepts 
$$-4 \& 5$$
 on the axes.

- (A) 5x + 4y 20 = 0
- **(B)** 5x + 4y + 20 = 0
- (C) 5x 4y + 20 = 0
- **(D)** -5x + 4y + 20 = 0

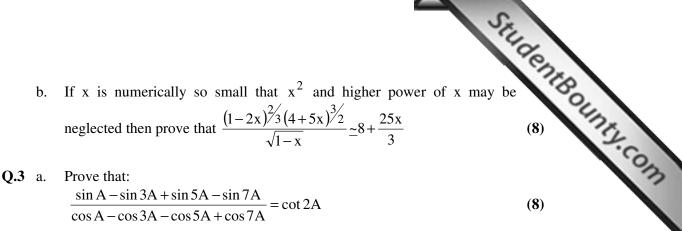
## Answer any FIVE Questions out of EIGHT Questions. Each question carries 16 marks.

**Q.2** a. Find three numbers in G.P. whose sum is 13 and the sum of whose squares is 91. **(8)** 

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b. If x is numerically so small that  $x^2$  and higher power of x may be neglected then prove that  $\frac{(1-2x)^{2/3}(4+5x)^{3/2}}{\sqrt{1-x}} \approx 8 + \frac{25x}{2}$ 



- b. In any triangle ABC, prove that:  $(b-c)\cot\frac{A}{2} + (c-a)\cot\frac{B}{2} + (a-b)\cot\frac{C}{2} = 0$ **(8)**
- **Q.4** a. Prove by the principle of mathematical induction that for all  $n \in N$ : 1+4+7+....+(3n-2)=  $\frac{1}{2}$ n(3n-1) **(8)** 
  - If p be the length of perpendicular from the origin to the line whose intercepts on the axes are a & b respectively then show that  $\frac{1}{n^2} = \frac{1}{a^2} + \frac{1}{b^2}$
- Find the equation of circle which passes through the points (5,-8), (2,-9)**Q.5** a. & (2, 1). Find also the co-ordinates of its centre & radius. **(8)** 
  - Find the equation of the parabola whose focus is (1,-1) and whose vertex is (2,1). Also find its axis. **(8)**
- Differentiate  $y = a^x$  w.r.t. 'x' from first principle. **Q.6** a. **(8)**

b. If 
$$y = \log \sqrt{\frac{a + b \sin x}{a - b \sin x}}$$
, then find  $\frac{'dy'}{dx}$  (8)

Find all the points of maxima minima and the corresponding maximum **Q.7** a. and minimum values of the function:

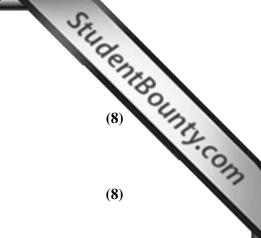
$$f(x) = -x^3 + 12x^2 - 5 (8)$$

b. Evaluate 
$$\int \frac{\log x}{x^2} dx$$
 (8)

Q.8 a. Evaluate 
$$\int_{0}^{\pi/4} \log(1 + \tan x) dx$$
 (8)

b. Evaluate 
$$\int \frac{x-1}{x^3+1} dx$$
 (8)

DE01/DC01 / ILINE - 2011 DIDIFTE - FT / CS (OI D SCHEME) **Q.9** a. Find the area of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b$ 



b. Solve the differential equation

$$(x+y+1)\frac{\mathrm{d}y}{\mathrm{d}x} = 1$$