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BET-011

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DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) /DIPLOMA IN MECHANICAL ENGINEERING (DME)

DCLEVI/DMEVI/DELVI/DECVI/DCSVI/ ACCLEVI/ACMEVI/ACELVI/ACECVI/ACCSVI

Term-End Examination

June, 2013

BET-011 : MATHEMATICS-I

Time : 2 hours *Maximum Marks : 70*

Note : *Question No. 1 is **compulsory**. Attempt **any four** more questions out of the remaining. Use of scientific calculator is **permitted.***

1. Answer ***any seven*** of the following : **2x7=14**

(a) Find the unit vector along $\vec{i} + \vec{j}$

(b) In flow chart what is the meaning of the following shape

◯ circle.

(c) Express $5\sqrt[3]{4}$ as a pure surd.

(d) What is the characteristic of the logrithms of 0.3741.

(e) Which term of the sequence

$-3, -7, -11, -15,$ ..... is -403.

(f) Find the co - efficient of x^{10} in the binomial expansion of $\left(2x^2 - \frac{3}{x}\right)^{11}$

(g) Find the value of

$$\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$$

(h) Find the equation of a line passing through the points (3, 4) and (2, −1)

(i) Find the eccentricity of the hyperbola $3x^2 - y^2 = 4$.

(j) Find the equation of a circle passing through the origin and making intercepts 4, 5 respectively on the co - ordinates axis.

2. (a) Simplify : 5, 4, 5

$$\left(3\sqrt{5} - 5\sqrt{2}\right)\left(4\sqrt{5} + 3\sqrt{2}\right)$$

(b) If $\log_{10}2 = .30103$ evaluate $\log_{10}\left(\frac{1000}{256}\right)$.

(c) Find the roots of the equation :

$$(x^2 - 5x)^2 - 30(x^2 - 5x) - 216 = 0$$

3. (a) If the 3rd term of an A.P is 18 and the seventh term is 30, Find the series. 4, 5, 5

(b) Find the sum of 50 terms of the sequence $7, 7.7, 7.77, 7.777, \_\_\_\_\_$.

(c) Prove that if a, b, c are in A.P then

$\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ are also in A.P.

4. (a) Using Binomial theorem, Find the value of $(99)^4$. 5,4,5

(b) Find the value of $\tan 22°.30'$.

(c) If A, B, C are angles of a triangle, Prove that :

$$\tan\frac{B}{2}\tan\frac{C}{2} + \tan\frac{C}{2}\tan\frac{A}{2} + \tan\frac{A}{2}\tan\frac{B}{2} = 1$$

5. (a) From the top of a cliff 60 m high, the angle of depression of the top and bottom of a tower are observed to be 30° and 60° respectively. Find the height of the tower. 6, 4, 4

(b) Prove that :

$$\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) = 2\tan^{-1}x, x \geq 0$$

(c) Find the equation of a line perpendicular to the line $3x-4y+7=0$ and passing through the point $(-3, 2)$

6. (a) Find the equation of a circle which passes through the points $(2, -2)$ and $(3, 4)$ and has its centre on the line $2x+2y=7$. **5, 4, 5**

(b) Find the vertex, focus and directrix of the parabola.

$4y^2+12x-12y+39=0$

(c) Find the equation of an ellipse whose focus is $(-1, 1)$, directrix is the line $x-y+3=0$ and eccentricity is $\frac{1}{2}$.

7. (a) Find a unit vector perpendicular to both the vectors $\vec{a}=2i+j-k$ and $\vec{b}=i-j+2k$ **5,4,5**

(b) Show that the vectors

$\vec{a}=3i-2j+k, \vec{b}=i-3j+5k, \vec{c}=2i+j-4k$

form a right angled triangle.

(c) Prove that the line joining the mid points of two sides of a triangle is parallel to the third.