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BET-011

01845

Diploma in Civil Engineering / Diploma in Electrical & Mechanical Engineering

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

Term-End Examination

June, 2012

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 questions. Use of calculator is permitted.*

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

(a) Express $53\sqrt{4}$ as a pure surd.

(b) Evaluate $\log_{81} 27$

(c) Without solving, discuss the nature of the roots of the equation $3x^2 + 5x + 7 = 0$

(d) Which term of the A.P :

21, 42, 63, 84, _____ is 420 ?

(e) Find the 12^{th} term of the G.P

2, -6, 18, -54, _____ .

(f) What is the meaning of the following box in a flow chart ?

(g) Prove that

$$\tan A = \frac{2\tan\frac{A}{2}}{1-\tan^2\frac{A}{2}}$$

(h) For the parabola $x^2 = 4ay$, $a > 0$. Find the equation of the directrix and the co - ordinates of its focus.

(i) If $\vec{A} = \vec{i} + \vec{j} + \vec{k}$ and $\vec{B} = 2\vec{i} + 4\vec{j} + 5\vec{k}$ find the projection of $\vec{B}$ on $\vec{A}$.

(j) Find the equation of a line passing through (4, 3) and slope 2.

2. (a) Without using tables, find the value of **4, 4, 6**

$\cot 12° \cot 38° \cot 52° \cot 60° \cot 78°$

(b) Prove that $\frac{\tan\theta + \sin\theta}{\tan\theta - \sin\theta} = \frac{\sec\theta + 1}{\sec\theta - 1}$

(c) There is a small island in the middle of a 100m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on the two banks and in line with the tree. If the agles of elevation of the top of the tree from P and Q are respectively $30°$ and $45°$, find the height of the tree.

3. (a) If the first term of a G.P excceds the second term by 2 and the sum of infinite term is 50, find the G.P. 5,4,5

(b) Find the middle term in the expansion of

$$\left(3x-\frac{x^3}{6}\right)^7$$

(c) If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

4. (a) Find the equation of a line which has x intercept as -3 and is perpendicular to the line $3x + 5y = 4$. 5,4,5

(b) Find the equation of a circle which passes through the two points (1, 1), (2, 2) and whose radius is 1. Show that there are two such circles.

(c) Find the point at which the join of (2, 0) and $(-3,5)$ is divided in the ratio of 2 : 3 internally.

5. (a) Find the vertex, focus and directrix of the parabola $y^2 = 4x + 4y$. **5,4,5**

(b) Find the equation of an ellipse when focus is (1, 0), directrix is $x+y+1=0$ and eccentricity is $\frac{1}{\sqrt{2}}$.

(c) Solve the triangle ABC given a = 20 cm, b = 30 cm, c = 21 cm.

6. (a) If the vertices of a triangle are the points. **5,4,5**

$\vec{i} - \vec{j} + 2\vec{k}, 2\vec{i} + 3\vec{j} + 4\vec{k}, 3\vec{i} + 3\vec{j} + 4\vec{k}$

Find the length of the sides and the measure of angles of the triangle.

(b) Show that the vectors $A = 2\vec{i} - 3\vec{j} - \vec{k}$ and $B = -6\vec{i} + 9\vec{j} + 3\vec{k}$ are parallel

(c) The point of application of a force F (5, 10, 15) is displaced from the point A (1, 0, 3) to the point $(3, -1, -6)$. Find the work done by the force.