* 3022 *

C09–CM–102

3022

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2014

DCME—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. If $x \quad \frac{1}{x} \quad 4$, find the value of $x^2 \quad \frac{1}{x^2}$.

2. Find the value of ${}^{10}P_5$.

3. Show that

$$\frac{1}{x \quad 2} \quad \frac{1}{x \quad 2} \quad \frac{2x}{x^2 \quad 4}$$

4. Show that

$$\tan \frac{}{4} \quad A \quad \tan \frac{}{4} \quad A \quad 1$$

5. Show that

$$\frac{\sin 2A}{1 \quad \cos 2A} \quad \tan A$$

6. Find the modulus of (3 4*i*) (4 3*i*).

7. Find the centre and radius of the circle x^2 y^2 12x 6y 11 0.

8. Find the angle between the straight lines 3x 5y 1 0 and 2x 3y 8 0.

9. Differentiate $2e^x$ 3 cos x tan ^{1} x w.r.t. x.

10. Evaluate :

$$\lim_{x \to 0} \frac{\tan 37x}{\sin 11x}$$

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Find the value of

$$\begin{vmatrix} 2 & 3 & 1 \\ 1 & 2 & 0 \\ 4 & 5 & 3 \end{vmatrix}$$

(b) Find the adjoint of the matrix

$$\begin{matrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 3 & 2 & 1 \end{matrix}$$

12. *(a)* Solve (2 sin 1) (sin 1) 0.

(b) In any *ABC*, prove that sin A sin B sin C $\frac{s}{R}$.

13. *(a)* Show that

$$\frac{\sin 17A \quad \sin 7A}{\cos 17A \quad \cos 7A} \quad \tan 12A$$

(b) Show that

$$\tan \ ^{1}\frac{2}{3} \quad \cot \ ^{1}\frac{4}{3} \quad \tan \ ^{1}\frac{17}{6}$$

14. *(a)* Find the equation of parabola whose focus is (–1, 1) and directrix $x \quad y \quad 1 \quad 0$.

(b) Find the centre, vertices, eccentricity, foci, equations of directrices of the ellipse $4x^2 \quad 9y \quad 36$.

15. *(a)* Find the equation of the conic whose focus is at (1, 2) and directrix $2x \quad y \quad 1 \quad 0$ with eccentricity 3.

(b) Find the centroid of the triangle formed by the points (1, 1, 1), (1, –1, 1) and (–7, –3, –5).

16. *(a)* Differentiate $\sin(\log x)$ with respect to $\log(\sin x)$.

(b) If

$$u \quad \tan \ ^{1}\frac{x^3 \quad y^3}{x \quad y}$$

show that

$$x\frac{u}{x} \quad y\frac{u}{y} \quad \sin 2u$$

17. *(a)* The sum of two numbers is 32. Find them so that their product is maximum.

(b) If an error of 0·2 is made in measuring a length 10 cm, find the relative error and percentage error.

18. *(a)* Find the angle between the curves $x^2 \quad y^2 \quad 1$ and $xy \quad 2$ at $(\ 2, 1)$.

(b) A man of 2 m tall is approaching a lamppost at the rate of 0·5 m/sec. If the lamp is situated at a height of 8 m, find the rate at which the length of the shadow is decreasing.

★ ★ ★