



C14-A/AA/AEI/BM/CH/  
CHST/C/CM/EC/EE/CHPP/  
CHPC/CHOT/PET/M/RAC/MET

MNG/IT/TT/PCT-102

**4002**

**BOARD DIPLOMA EXAMINATION, (C-14)**

**MARCH/APRIL - 2018**

**FIRST YEAR (COMMON) EXAMINATION**

**ENGINEERING MATHEMATICS --I**

Time : 3 hours]

[ Total Marks : 80

**PART—A**

10×3=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. Resolve  $\frac{1}{(x+1)(x+3)}$  into partial fractions.

2. If  $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{bmatrix}$  find  $2A - 3B$ .

3. Evaluate  $\begin{vmatrix} \sec x & \sin x & \tan x \\ 0 & 1 & 0 \\ \tan x & \cos x & \sec x \end{vmatrix}$

4. If  $A + B = \pi/4$ , prove that  $(1 - \cot A)(1 - \cot B) = 2$ .

5. Prove that  $\cos x \cos (60^\circ + x) \cos (60^\circ - x) = \frac{1}{4} \cos 3x$ .

6. Find the multiplicative inverse of  $(2 + i)(-4 + 6i)$ .

7. Find the equation of the line passing through the points (2, 4) and (-2, 3)

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8. Find the equation to the circle having the points (1, 2) and (4, 5) as ends of the diameter.
9. Find  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$
10. Find the derivative of  $e^x \sec x$  with respect to  $x$ .

**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 evaluation is the content but not the length of the answer.

11. (a) Solve the equation  $2x - y + 3z = 9$ ,  $x + y + z = 6$  and  $x - y + z = 2$  using inverse matrix method.

(b) Solve 
$$\begin{vmatrix} x+1 & 2 & 3 \\ 1 & x+2 & 3 \\ 1 & 2 & x+3 \end{vmatrix} = 0$$

12. (a) Show that  $2 \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} = \tan^{-1} \frac{47}{79}$ .

(b) In a  $\Delta ABC$ , prove that  $\tan \frac{A}{2} \tan \frac{B}{2} + \tan \frac{B}{2} \tan \frac{C}{2} + \tan \frac{C}{2} \tan \frac{A}{2} = 1$ .

13. (a) If  $\cos x + \cos y = \frac{1}{3}$  and  $\sin x + \sin y = \frac{1}{4}$ . Find the values of  $\sin(x+y)$  and  $\cos(x+y)$ .

(b) Solve  $\cos x - \sin x = 1$ .

14. (a) Find the equation of the parabola whose directrix is parallel to X-axis and which passes through the points (1,0), (0,1) and (2,3).

(b) Find the equation of the hyperbola whose vertices are (2, 3) (-2, 3) and eccentricity  $5/2$ .

15. (a) If  $y = \sin^n(x^2 e^{2x})$ , find  $\frac{dy}{dx}$  .  
 (b) Find  $\frac{dy}{dx}$ , if  $x^y y^x = 1$ .
16. (a) Find  $\frac{dy}{dx}$ , if  $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \dots \infty}}}$  .  
 (b) If  $u = \sin^{-1} \left[ \frac{x+y}{\sqrt{x} + \sqrt{y}} \right]$ , prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$  .
17. (a) Find the angle between the curves  $y^2 = 2x$  and  $x^2 + y^2 = 8$  at their point of intersection (2, 2).  
 (b) A particle is moving along a straight line according to the law  $S = 2t^3 - 3t^2 + 15t + 18$  ( $t$  is in seconds). Find its velocity when its acceleration is zero.
18. (a) A rectangular sheet of metal is 24 cm long and 9 cm wide. Equal squares are cut-off from the corners and the flaps are then folded up to form an open box. Find its maximum volume.  
 (b) If an error of 1% is committed in measuring the side of square plate, find the approximate percentage error in its area.

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