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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 $\cos x \cos(60°+x) \cos(60°-x) = \frac{1}{4}\cos 3x$.

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)

8. Find the equation to the circle having the points (1, 2) and (4, 5) as ends of the diameter.

9. Find $\underset{x\to 0}{\text{Lt}} \dfrac{1-\cos x}{x}$

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 ΔABC, 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 though 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 $y = \sin^n\left(x^2 e^{2x}\right)$, find $\frac{dy}{dx}$.

(b) Find $\frac{dy}{dx}$, if $x^y y^x = 1$.

16. *(a)* Find $\frac{dy}{dx}$, if $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \ldots. \infty}}}$.

(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 panticle 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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