

003 - MATHEMATICS

UG-TRB - KEY - Date: 4/2/24

'D' Question Booklet series

H S W  
4/2/24

31 B)  $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$

32 D) 
$$\frac{4 \tan \theta - 4 \tan^3 \theta}{1 - 6 \tan^2 \theta + \tan^4 \theta}$$

33 D)  $y = -\log 2$

34 B)  $\log(1+x)$

35 C)  $y^4 + xy^2 - 180y - 12 = 0$

\* 36 No option

37 A) 1

38 A) 0

39 D)  $(0, 1, 1)$  and  $(-1, 0, 1)$

40 D)  $\pi a^2$

41 C)  $e^{2x} [C_1 \cos \sqrt{\beta} x + C_2 \sin \sqrt{\beta} x]$

42 A)  $L(y(x)) = \frac{1}{(s-1)(s+3)(s^2+1)}$

43 C)  $x + y \frac{dy}{dx} = 0$

44 D) Envelop.

45 A)  $y^2 + z^2 + x + z + 3 = 0$

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- 46 c)  $\pi/2t$
- 47 c)  $y \frac{\partial z}{\partial x} = x \cdot \frac{\partial z}{\partial y}$
- 48 c)  $\alpha = 2/3, \beta = 1$
- \* 49 c)  $x - t = 0$  (Error)
- 50 B)  $f(t) = \frac{1}{t} \sin \frac{1}{t}, t \neq 0$  and  $f(0) = 1$  over  $(-\infty, \infty)$
- 51 D) Bernoulli's equation
- 52 D)  $2/25$
- 53 D)  $f(t) = \begin{cases} et, & t \neq 5, 8 \\ 6, & t = 5 \\ 0, & t = 8 \end{cases}$
- 54 c)  $y dx + (x + y^2) dy = 0$
- 55 c) -1
- 56 c)  $\pi/2$
- 57 c)  $8\pi/3$
- 58 B) -i s f(s)
- 59 B)  $(e-1)\vec{i} + \frac{1}{2}(e^2+1)\vec{j} + \frac{1}{2}\vec{k}$
- 60 B)  $4/n^2$
- 61 A) 4
- 62 A)  $1/2$
- 63 A) Between 1 and 2
- 64 B) 11, 36
- 65 A) 1170
- 66 A) 1

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- 67 A)  $3/2$
- 68 B)  $i(2n\pi - \pi/2)$
- 69 A)  $\tan \alpha = \tan h \beta$
- 70 c)  $q^2 - 2pr + 2s$
- 71 D) 
$$\frac{2^{14} 8! 9!}{16!}$$
- 72 c)  $9\pi(2 - \sqrt{2})$  cubic units
- 73 B)  $x^3 - 6x^2y + 11xy^2 - 6y^3 = x$
- 74 a)  $\pi a^2$  sq. units
- 75 c) 
$$\frac{a^n}{(n+1)r^{n-1}}$$
- 76 B)  $\frac{\pi}{2} a^4$
- \*  
77 \*
- 78 D)  $\pi$
- 79 B)  $b$
- \*  
80 \*  $(SP)^{3/2}$
- 81 A)  $\phi$  is 1-1, onto and a homomorphism
- 82 A) a ring and is homomorphic image of  $R$
- 83 A)  $R$  is commutative  $\Rightarrow R/I$  is commutative
- 84 B) A homomorphism is 1-1 iff its kernel is  $\{0\}$
- 85 B)  $Z$  is an integral domain but not a field
- 86 B)  $n!/2$
- 87 A)  $-2$

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- 88 B) 1 (All options are correct)
- 89 D)  $4/e$
- 90 D) infinite
- 91 B) Boolean ring
- 92 B)  $m$
- 93 B)  $48$
- 94 A)  $\mathbb{R}^+$  over  $\mathbb{R}$
- 95 A)  $(W_1 + W_2)^\perp = W_1^\perp \cap W_2^\perp$
- 96 C)  $1/3$
- 97 A)  $[0, \infty)$ , converges uniformly to 0
- 98 A)  $1/2$  and 1
- 99 D)  $3/5$
- 100 A)  $\left\{ \frac{1}{\sqrt{n}} \right\}_{n=1}^{\infty}$
- 101 A)  $2t^3 \vec{i} + 25t^4 \vec{j} + 5t^2 \vec{k}$
- 102 C)  $x^2y + xz^3 + C$
- 103 B)  $\vec{v} \times \frac{d\vec{v}}{dt} = 0$
- 104 D) 0
- 105 B) 30
- 106 C)  $\pi^2/6$
- \* 107 B) 2 (Error)
- 108 A)  $\sqrt{\frac{2}{\pi}} \frac{\sin \alpha s}{s}$
- 109 A) solenoidal
- 110 B)  $-1/2$

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- 111 B)  $\frac{\pi i}{2}$
- 112 C)  $\pi/4$
- 113 B) two singular points  $z=0$  and  $z=\infty$
- 114 A) e
- 115 A)  $3\frac{1}{2} \neq 2i$  (Error)
- 116 C) absolutely convergent
- 117 \* Star (Error)
- 118 B)  $\bar{z}$
- 119 C)  $1/6$
- 120 A)  $2+i, 3$
- 121 A) 5
- 122 C)  $2\pi i \sum_{j=1}^n \text{Res} \{ f(z); z_j \}$
- 123 A) 1
- 124 C)  $|z-1| < 1$
- 125 A)  $1, \frac{-1+i\sqrt{3}}{2}, \frac{-1-i\sqrt{3}}{2}$  ( $1, \omega, \omega^2$ )
- 126 C)  $\frac{\pi}{4}$
- 127 A) 3.176
- 128 C)  $\frac{a \sqrt{b^2 - t^2}}{b + t}$  mlsec
- 129 A)  $2\sqrt{2} P$
- 130 B) 0.75
- 131 B) Not continuous at  $n=0$

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- 132 B)  $[0, n)$ ,  $0 < n < 1$ , is open in  $[0, 1]$
- 133 D)  $\pi/2$
- 134 D)  $\{(-1)^n\}_{n=1}^{\infty}$
- 135 C)  $p > 1$
- 136 A)  $\{(m, y) \in \mathbb{R}^2, am + by < c\}$
- 137 B)  $f(x) = \frac{1}{x}$ ,  $0 < x < 1$
- 138 A) open
- 139 A) continuous at  $x=0$  but not differentiable at  $x=0$
- 140 B) I and III alone is true.
- 141 D) 1
- 142 \* Error
- 143 B) 22-5
- 144 C) Geometric mean of Laspeyres's and Paasche's index
- 145 C) 0.38
- 146 D) (i), (ii), (iii) true
- 147 B) 4/11
- 148 C)  $17^6/1024$
- 149 A) 12, 4.5
- 150 C) 0.1253, 2.172
- 151 B)  $p \leq 1$ ,  $q > 7$
- 152 C) -48
- 153 B) 12075
- 154 A)  $n!$  solutions
- 155 A)  $(0.8)^5$

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156) A) 0

157) B) 4/9

158) B) 19.15

159) B) 0.833

160) B) 195.2

161) D)  $v_1 = 0$

162) A)  $\ddot{r} - r\dot{\theta}^2$

163) B)  $\frac{1}{10\pi}$  metre

164) C)  $2p \cos \frac{\alpha}{2}$

165) C)  $\frac{2u \sin \alpha}{g}$

166) D) 20 km per hour

167) C) 180 N

168) D)  $\frac{3Mr^2}{10}$

169) D)  $\frac{d^2y}{dy^2} + u = -\frac{\phi(r)}{h^2u^2}$

170) C) Two unlike parallel forces of same magnitude.

171) B)  $\frac{7}{11}$

172) (B) (1)  $\rightarrow$  (2)  $\rightarrow$  (4)  $\rightarrow$  (5)  $\rightarrow$  (6)

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- 173) c) 1000 Units
- 174) c)  $[-1, 2]$
- 175) c) 3
- 176) B)  $1/9$
- 177) A)  $x_1=6, x_2=12, z=240$
- 178) A)  $(1/2, 1/2)$
- 179) D) Rs: 23
- 180) c) no feasible solution

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All The Best

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H.Dms  
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