

Answer Ex-I**SINGLE CORRECT (OBJECTIVE QUESTIONS)**

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|-------|-------|-------|-------|-------|-------|-------|
| 1. C | 2. D | 3. C | 4. D | 5. A | 6. C | 7. B |
| 8. A | 9. D | 10. D | 11. C | 12. A | 13. A | 14. B |
| 15. D | 16. C | 17. A | 18. B | 19. C | 20. C | 21. B |
| 22. A | 23. B | 24. D | 25. D | 26. D | 27. A | 28. B |
| 29. C | 30. B | 31. C | 32. C | 33. A | 34. D | 35. A |
| 36. B | 37. D | 38. A | 39. B | 40. C | 41. A | 42. C |
| 43. A | 44. B | 45. A | 46. B | 47. D | 48. C | 49. A |
| 50. D | 51. C | 52. B | 53. D | | | |

Answer Ex-II**MULTIPLE CORRECT (OBJECTIVE QUESTIONS)**

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|--------|---------|--------|--------|---------|--------|---------|
| 1. D | 2. ACD | 3. B | 4. ACD | 5. AC | 6. BD | 7. AC |
| 8. BD | 9. AC | 10. AD | 11. AC | 12. AC | 13. AC | 14. ABD |
| 15. BC | 16. ACD | 17. BC | 18. AC | 19. ACD | | |

Answer Ex-III**SUBJECTIVE QUESTIONS**

- (i) maxima (ii) minima (iii) neither maxima nor minima

(iv) neither maxima nor minima (v) neither maxima nor minima

(vi) maxima
- $a = b = 3$
- (i) local max at $x = 1$, local min at $x = 6$ (ii) local max. at $x = -1/5$, local min. at $x = -1$

(iii) local minima at $x = \frac{1}{e}$, No local maxima
- minima at $x = 0$
- (i) 3 points, $x = 0, -3, -5$ (ii) ∞ points, $x \in [-1, 2]$

(iii) 2 points, $x = \frac{\pi}{4}, \frac{3\pi}{4}$
- local max. at $x = 1$, local min. at $x = 2$
- (i) max. = 8, min. = -8 (ii) max. = $\sqrt{2}$, min. = -1

(iii) max. = 8, min. = -10 (iv) max. = 25, min. = -39

(v) max. at $x = \pi/6$, max. value = $3/4$; min. at $x = 0$ & $\pi/2$, min. value = $1/2$
- Greatest and least values are not defined
- $b \in (0, e]$

11. (i) local max. at $x = -1$, Maxima of $f(x) = -2$, local min. at $x = 1$, Minima of $f(x) = 2$
 (ii) Local Minima at $x = \frac{\pi}{2} + 2n\pi$, $n \in \mathbb{I}$, Minima of $f(x) = 1$,
 Local Maxima at $x = -\frac{\pi}{2} + 2n\pi$, $n \in \mathbb{I}$, Maxima of $f(x) = -1$
12. It is a global maxima. 14. $\frac{80\pi}{\pi+4}, \frac{20\pi}{\pi+4}$ 17. 12cm, 6 cm
18. 40 mph 19. $27\sqrt{3}$ sq. cms. 20. width $2\sqrt{3}$ m, length $3\sqrt{3}$ m
22. $\left(\frac{1}{2}, \frac{5}{4}\right)$ 23. $f(x) = 2x^4 - \frac{12}{5}x^5 + \frac{2}{3}x^6$ 24. $\frac{4\pi r^2}{3\sqrt{3}}$
25. Rs. 400 26. 5 km. from B towards A 27. $\cos A = 0.8$
28. $\frac{4\sqrt{3}}{9}$ 29. $2\pi/3$ 30. side 10', height 10'
31. Global maximum $\frac{\pi}{6} + \frac{1}{4} \ln 3$, Global minima $\frac{\pi}{3} - \frac{1}{4} \ln 3$ 32. $\frac{3\sqrt{3}}{8} a^2$

Answer Ex-IV**ADVANCED SUBJECTIVE QUESTIONS**

1. $f(x) = x^3 + x^2 - x + 2$
2. (a) Max. at $x = 2\pi$, Max. value = 2π , Min. at $x = 0$, Min. value of = 0
 (b) Max. at $x = \pi/6$ & also at $x = 5\pi/6$ and Max. value = $3/2$, Min. at $x = \pi/2$, Min. value = -3
3. $f(x) = \frac{2}{3}x^6 - \frac{12}{5}x^5 + 2x^4$ 4. $P_{\max.} = a \left(1 + \operatorname{cosec} \frac{\alpha}{2}\right)$
5. $75\sqrt{3}$ sq. units. 6. $r = \sqrt{\frac{2A}{\pi+4}}, s = \sqrt{\frac{2A}{\pi+4}}$
8. $3x + 4y - 9 = 0$; $3x - 4y + 9 = 0$ 9. $4\sqrt{2}$ m
10. $1/\pi$ cu m 11. 110', 70' 12. side 10', height 10'
13. 32 sq. units 14. $\theta = 60^\circ$ 15. $a = 1$, $b = 0$
17. width $2\sqrt{3}$ m, length $3\sqrt{3}$ m 18. $|a - b|$
19. (a) $(-1, 0)$, $(0, 5/6)$ (b) $F'(x) = (x^2 - x)$, $F''(x) = 2x - 1$
 (c) increasing $(-\infty, 0) \cup (1, \infty)$ decreasing $(0, 1)$; (d) $(0, 5/6)$; $(1, 2/3)$; (e) $x = 1/2$

20. (a) $x = y = \frac{d}{\sqrt{2}}$ (b) $x = \frac{d}{\sqrt{3}}, y = \sqrt{\frac{2}{3}} d$ 21. $6' \times 18'$
22. $r = \sqrt{A}, \theta = 2$ radians 23. (a) 0, 3 (c) $\frac{3}{4}, t = \ln 4$ 24. $\cos A = 0.8$
26. (0, 0) 28. $p < a < \frac{32p^3}{27} + p$ if $p > 0$; $\frac{32p^3}{27} + p < a < p$ if $p < 0$
30. 4 when $a = \sqrt{2}$
31. (a) f is continuous at $x = 0$ (b) $-\frac{2}{e}$
 (c) does not exist, does not exist; (d) point of inflection $x = 1$
32. (a) $x = -2\pi, -\pi, 0, \pi, 2\pi$ (b) no inflection point
 (c) maxima at $x = \frac{\pi}{2}$ and $-\frac{3\pi}{2}$ and no minima,
 (d) $x = \frac{3\pi}{2}$ and $x = -\frac{\pi}{2}$, (e) $-\pi \ln 2$
33. 4 34. $m \in \left(\frac{1}{32}, \frac{1}{16}\right)$ 35. $\frac{\pi}{4}$ 36. 320
37. $H = x = \left(\frac{4V}{\sqrt{3}}\right)^{1/3}$ 38. $L/4$ 39. $\frac{\pi}{3}$
40. (a) increasing in $(0, 2)$ and decreasing in $(-\infty, 0) \cup (2, \infty)$, local min. value = 0 local max. value = 2
 (b) concave up for $(-\infty, 2 - \sqrt{2}) \cup (2 + \sqrt{2}, \infty)$ and concave down in $(2 - \sqrt{2}, 2 + \sqrt{2})$
 (e) $f(x) = \frac{1}{2} e^{2 \cdot x} \cdot x^2$

Answer Ex-V**JEE PROBLEMS**

1. A 2. 2ab 3. (a) D; (b) A 4. A
 5. (a) (2, 1); (b) 5 6. (a) D 7. $4\sqrt{65}$
 8. (a) B, C; (b) A (c) 6 solutions 9. (a) C; (b) (i) A, (ii) A, (iii) B
 10. (a) 0; (b) 7 11. (a) D, (b) 1