KARNATAKA BOARD 2ND PUC MODEL PAPER – SET 1
MATHEMATICS

Time: 3 hours 15 minutes **Max Marks: 100**

Instructions : 1) The question paper has 5 parts A, B, C, D & E. Answer all the parts.
2) Part A carries 10 marks, Part B carries 20 marks, part C carries 30 marks, part D carries 30 marks and part E carries 10 marks.
3) Write the question numbers propertly as indicated in the question paper.

PART - A

I. Answer all the ten questions : **1×10=10**

1. **Find x if** $\begin{vmatrix} 3 & x \\ 4 & 5 \end{vmatrix} = -2$.
2. **How many different arrangements can be made from the letter of the word "BOOKS".**
3. **Simplify 2 Cos 70° Cos 10°.**
4. **Negate: "If I pass in preparatory then I will pass in finals".**
5. **Find mean proportional of 4 and 16.**
6. **Define: Learning Curve Ratio.**
7. **If the radius of the circle $x^2 + y^2 + 4x - 2y - k = 0$ is 4 units find k.**
8. **Evaluate:** $\lim_{\theta \to 0} \frac{\sin 3\theta}{\tan 2\theta}$
9. **If $y = \sin(\log x)$ find** $\frac{dy}{dx}$
10. **Evaluate:** $\int_0^1 e^{2x} dx$

PART - B

II. Answer any Ten questions : **10×2=20**

11. **Solve by Cramer's rule:**
    $x + 2y = 8$
    $2x - y = 1$
12. **If a convex polygon has 170 diagonals find the number of sides of the polygon.**
13. **A box contains 5 defective and 15 non-defective bulbs. Two bulbs are chosen at random. Find the probability that both the bulbs are non-defective.**

14. Write the converse and inverse of the proposition: "If 2 is prime then 3 is even".
15. Two numbers are in the ratio 3:5. If 9 is subtracted from each the new numbers are in the ratio 12:23. Find the smaller number.
16. Find the true discount on Rs.1380, due $1\frac{1}{2}$ years after at 10% p.a
17. A shopkeeper purchases an article for Rs. 9,000 and sells it to a customer for Rs.10500. If the VAT rate is 4%. Find the VAT paid by the shopkeeper and the amount paid by the customer.
18. Find the value of sin 105°.
19. Find equation of the parabola given that its vertex is (0,0) focus is (–3,0).
20. Find k for which $f(x)=\begin{cases}\frac{x^3-27}{x-3} & \text{when } x\neq 3\\ k & \text{when } x=3\end{cases}$ is continuous at $x=3$.
21. If $y=\sqrt{\sin x+\sqrt{\sin x}+.....\infty}$. Prove that $\frac{dy}{dx}=\frac{\cos x}{2y-1}$.
22. A particle moves a distance S = $6t^2 - t^3 + 5$($s = mt$, t = sec) then find velocity and acceleration after 3 second.
23. The marginal cost function of a firm is $3x^2 - 20x + 100$ when x is the level of output. Find the total cost function if the total fixed cost is Rs.500. What is average cost?
24. Evaluate $\int_0^{\frac{\pi}{2}}(\sin x+\cos x)dx$

PART - C

III. Answer any Ten questions : 10×3=30

25. If $A=\begin{bmatrix}2 & -1\\ -1 & 2\end{bmatrix}$ show that $A^2 - 4A + 3I = 0$
26. Solve: $\begin{vmatrix}3x-8 & 3 & 3\\ 3 & 3x-8 & 3\\ 3 & 3 & 3x-8\end{vmatrix}=0$
27. A committee of 5 to be formed from 8 Americans and 5 Anglo Indians. In how many ways can this be done when the committee contains.
    (a) Exactly two Anglo Indians (b) At least two Anglo Indians
28. A bag contains 6 Red, 4 White and 2 Black balls, 2Balls are drawn at random. What is the probability that the balls drawn are
    (a) Both Red (b) 1 white and 1 black (c) Same colour

29. A railway train 100 meters long is running at the speed of 30Kmph. In what time will it pass
    (a) Man standing near the line (b) A bridge 100 meters long.
30. A bill for Rs.14,600 drawn at 3 months after date was discounted on 11–11–15 for Rs.14320. If the discount rate is 20% p.a on what date was the bill drawn.
31. Chandana purchases an article for Rs.5400 which include 10% rebate on the market price and 20% sales tax on the remaining price. Find the marked price of the article.
32. Jane sells her Rs. 12500, 4.5% stock at 94. How much of 9% stock at 125 can Jane purchase from the sale proceeds of the former stock. What is the change in Jane's income?
33. Find the equation of directrix and end points of latus rectum of the parabola
    $3x^2 - 4y = 0$.
34. If $\cos y = x\cos(a+y)$ show that $\frac{dy}{dx} = \frac{\cos^2(a+y)}{\sin a}$.
35. A ladder of 15ft long leans against a smooth vertical wall. If the top slides downwards at the rate of 2ft/sec. Find how fast the lower end is moving when the lower end is 12ft from the wall.
36. Divide 64 into two parts such that the sum of the cubes of two parts is minimum.
37. Evaluate: $\int_0^{\frac{\pi}{2}} x\sin x\,dx$
38. Evaluate: $\int \frac{x-1}{(x^2-9)x}dx$

PART - D

IV. Answer any 6 questions: 5×6=30

39. Solve using matrix method
    $x - y - 2z = 3$
    $2x+y+z = 5$
    $4x - y - 2z = 1$
40. Find the term independent of x in $\left[\frac{\sqrt{x}}{2} - \frac{2}{x^2}\right]^{10}$
41. Resolve into partial fractions $\frac{x}{(x+1)^2(x+2)}$.
42. Verify whether the proposition $(p\wedge\sim q)\wedge(\sim p\vee q)$ is a contradiction or not.

43. A can do a piece of work in 20days, B in 30days and C in 60 days. All of them began to work together. However A left the job after 6 days and B quit work 6 days before the completion of work. How many days did the work last.

44. An engineering company has 90% learning effect and spends 500 hours for the proto type. Estimate the labour cost of producing 7 engines of new order if the labour cost is Rs.40 per hour.

45. Solve the following L.P.P graphically.

Maximize $Z = x + y$

Subject to $2x + y \leq 50$

$X + 2y \leq 40$

$x, y \geq 0$

46. If $A + B + C = 180°$. Prove that $Cos2A + Cos2B + Cos2C = -1 - 4\ CosA\ CosB\ CosC$.

47. If $y = \sin(\log x)$ show that $x^2y_2 + xy_1 + y = 0$.

48. Find the area bounded by the parabola $y^2 = 16x$ and latus rectum.

PART-E

V. Answer any ONE question 1×10=10

49. Prove that

(a) $\lim_{x \to a} \frac{x^n - a^n}{x - a} = n.a^{n-1}$ for all n

(b) Find the value of $(1.1)^5$ using binomial theorem upto 4 decimals.

50. (a) Show that the points (2,0), (–1,3), (–2,0), (1, –1) are concyclic.

(b) A person at the top of hill observes that the angles of depression of two consecutive kilometer stones on a road leading to the foot of the hill and in the same vertical plane containing the position of the observer are 30° and 60°. Find the height of the hill.

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