

**BACHELOR'S DEGREE (C.B.C.S.) EXAMINATION, NOVEMBER 2022**  
**2020 ADMISSIONS REGULAR AND 2019, 2018 ADMISSIONS SUPPLEMENTARY**  
**SEMESTER V - OPEN COURSE (MATHEMATICS)**  
**MT5D01AB18 - APPLICABLE MATHEMATICS**

Time : 3 Hours

Maximum Marks : 80

**Part A****I. Answer any Ten questions. Each question carries 2 marks****(10x2=20)**

1. The sum of five consecutive numbers is equal to 60. Find the numbers.
2. Solve  $12x = -8x^2$
3. Write  $\log_8 256 = \frac{8}{3}$  in the exponential form.
4. From a deck of 52 cards, Justin picks up one at random. Compute the probability of it being a red non-face card?
5. Find the derivative of  $\cos(\log x)$ .
6. Compute  $\frac{d}{dx} \left( \frac{1}{\sqrt{3+2x}} \right)$
7. Determine whether two numbers can have 14 as their HCF and 204 as their LCM.
8. What is the smallest number by which 392 must be multiplied so that the product is a perfect cube?
9. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 80, compute the other.
10. Find the perimeter and area of a square whose side is 63 mm.
11. Compute the rate per cent per annum simple interest, at which a sum treble itself in 16 years?
12. At what rate percent per annum will Rs. 6950 produce Rs. 347.50 at simple interest in 5 months?

**Part B****II. Answer any Six questions. Each question carries 5 marks****(6x5=30)**

13. a) There are 4 oranges, 5 apples and 6 mangoes in a basket. Calculate the number of ways in which a person can make a selection of fruits among the fruits in the basket? b) Calculate the number of different ways in which the letters of the word 'MATHEMATICS' can be arranged such that the vowels must always come together?
14. Sketch the graph of  $3x - 2y = 8$
15. Compute  $\int \frac{\cos 2x}{(\cos x + \sin x)^2} dx$
16. Compute  $\frac{d}{dx} [\log(2x + 3) e^{3x} \sin 4x]$
17. A man sold two articles at Rs. 375 each. On one he gains 25% and on the other he loses 25%. How much does he gain or lose in the whole transaction?
18. If  $a + b + c = 6$  and  $ab + bc + ca = 11$ , find the value of  $a^3 + b^3 + c^3 - 3abc$
19. The difference between the compound interest and simple interest on a certain sum of money at 10% per annum for 2 years is Rs. 500. Compute the sum when the interest is compounded annually.

20. If 5 men with 7 boys can earn Rs. 3825 in 6 days and 2 men with 3 boys can earn Rs. 1050 in 4 days, in what time will 7 men with 6 boys earn Rs. 22500
21. Compute the area of a rectangular plot, one side of which is 48 cm and its diagonal 50 cm.

**Part C**

**III. Answer any Two questions. Each question carries 15 marks**

**(2x15=30)**

22. a) Two pillars of equal height are on either side of a road, which is 100 m wide. The angles of elevation of the top of the pillars are  $60^\circ$  and  $30^\circ$  at a point on the road between the pillars. Find the position of the point between the pillars and the height of each pillar. b) An aeroplane at an altitude of 1200 metres finds that two ships are sailing towards it in the same direction. The angles of depression of the ships as observed from the aeroplanes are  $60^\circ$  and  $30^\circ$  respectively. Find the distance between the two ships.
23. (a). Two unbiased coins are tossed. Write the probability of getting (i) 2 heads (ii) 1 head (iii) 0 head.

(b). Compute  $\int \frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}} dx$

24. 
$$\frac{(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3}{(a - b)^3 + (b - c)^3 + (c - a)^3}$$

- a) Calculate
- b) Rani's weight is 25% that of Meena's and 40% that of Tara's. Determine what percentage of Tara's weight is Meena's weight?
25. (a). A and B together can do a piece of work in 12 days, which B and C together can do in 16 days. After A has been working at it for 5 days and B for 7 days, C finishes it in 13 days. In how many days could each do the work by himself. (b). Reena borrowed from Kamal certain sum for two years at simple interest. Reena lent this sum to Hamid at the same rate for two years compound interest. At the end of two years, she received Rs.110 as compound interest but paid Rs. 100 as simple interest. Calculate the sum and rate of interest.