



# CAREER POINT

## PRE FOUNDATION DIVISION

### FACULTY SELECTION TEST

#### MATHS

[Time : 2 Hr.]

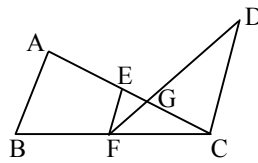
[Max. Marks : 60]

#### INSTRUCTIONS :

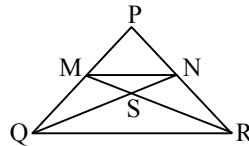
1. Attempt all questions.
2. Indicate your answer on the question paper itself.
3. Each question has four options. Out of these only one is the correct answer.
4. Each correct answer carries +1 marks. for each wrong answer 0.25 marks will be deducted.

- Q.1** Salary of an officer increases every year by 20%. His salary in the year 2001 was Rs. 26, 640. What was his salary in 1999 ?  
(A) Rs. 20, 000                      (B) Rs. 19, 028                      (C) Rs. 18, 500                      (D) Rs. 18, 840
- Q.2** A man sells 10 oranges for a rupee gaining there by 40%. How many orange did he buy for a rupee ?  
(A) 12                                      (B) 14                                      (C) 13                                      (D) 15
- Q.3** If the altitude of an equilateral triangle is  $\sqrt{6}$  cm, its area (in  $\text{cm}^2$ ) is  
(A)  $2\sqrt{2}$                       (B)  $2\sqrt{3}$                                       (C)  $3\sqrt{3}$                                       (D)  $6\sqrt{2}$
- Q.4** If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + c = 0$ , then  $\frac{\alpha}{\alpha\beta + b} + \frac{\beta}{a\alpha + b} =$   
(A)  $2/a$                                       (B)  $2/b$                                       (C)  $2/c$                                       (D)  $-2/a$
- Q.5** The three points  $(-2, 2)$ ,  $(8, -2)$  and  $(-4, -3)$  are the vertices of  
(A) an isosceles triangle                                      (B) an equilateral triangle  
(C) a right angled triangle                                      (D) None of these
- Q.6** The circle  $x^2 + y^2 + 4x - 7y + 12 = 0$  cuts an intercept on y-axis equal to  
(A) 1                                      (B) 3                                      (C) 4                                      (D) 7
- Q.7** If  $\sin \theta + \operatorname{cosec} \theta = 2$ , then  $\sin^2 \theta + \operatorname{cosec}^2 \theta =$   
(A) 1                                      (B) 4                                      (C) 2                                      (D) None of these
- Q.8** The angle of elevation of a tower at a point distant d metres from its base is  $30^\circ$ . If the tower is 20 meters high, then the value of d is  
(A)  $10\sqrt{3}$  m                                      (B)  $20/\sqrt{3}$  m                                      (C)  $20\sqrt{3}$  m                                      (D) 10 m
- Q.9** The Probability of happening of an impossible event i.e.  $P(\phi)$  is  
(A) 1                                      (B) 0                                      (C) 2                                      (D) -1

- Q.10** If the volume of a sphere is divided by its surface area, the result is 27 cm. The radius of the sphere is -  
 (A) 9 cm (B) 27 cm (C) 81 cm (D) 243 cm
- Q.11** The volume of a cube with surface area  $726 \text{ m}^2$  is  
 (A)  $1300 \text{ m}^3$  (B)  $1331 \text{ m}^3$  (C)  $1452 \text{ m}^3$  (D)  $1542 \text{ m}^3$
- Q.12** The radius of a cylinder is the same as that of a sphere. Their volume are equal. The height of the cylinder is how many times its radius ?  
 (A)  $4/3$  (B)  $2/3$  (C) 1 (D) 2
- Q.13** If  $AB$ ,  $EF$  and  $DC$  are parallel in given figure and  $EG = 5 \text{ cm}$ ,  $GC = 10 \text{ cm}$ ,  $AB = 15 \text{ cm}$ ,  $DC = 18 \text{ cm}$ , then  $EF + AC$  is



- (A) 35 (B) 34 (C) 24 (D) 25
- Q.14** The sum of all abscissas of solution set of equation  $\frac{1}{\sqrt{x}} + \frac{1}{\sqrt{y}} = \frac{1}{\sqrt{20}}$  is, if  $x, y$  are positive integers.  
 (A) 290 (B) 305 (C) 464 (D) 500
- Q.15** By elimination of  $x$  from equations  $ax^2 - 2a^2x + 1 = 0$  &  $a^2 + x^2 - 3ax = 0$  we get  
 (A)  $a^6 + a^3 - 1 = 0$  (B)  $a^6 + a^3 + 1 = 0$  (C)  $a^6 - a^3 - 1 = 0$  (D) None of these
- Q.16** A water tap fills a tank in ' $p$ ' hours & the tap of the bottom of the tank empties it in  $q$  hours. If  $p$  is less than  $q$  & when both taps are open, the tank is filled in  $r$  hours, then  
 (A)  $\frac{1}{r} = \frac{1}{p} + \frac{1}{q}$  (B)  $\frac{1}{r} = \frac{1}{p} - \frac{1}{q}$  (C)  $r = p + q$  (D)  $r = p - q$
- Q.17** In  $\Delta PQR$ ,  $MN \parallel QR$  &  $PM : MQ = 5 : 4$  then ar (MNS) : ar (RSQ) is



- (A) 25 : 16 (B) 25 : 9 (C) 25 : 81 (D) 25 : 64
- Q.18** If  $x_1, x_2, x_3, \dots, x_n$  are consecutive natural numbers then the sum of  $\frac{1}{x_1x_2} + \frac{1}{x_2x_3} + \dots + \frac{1}{x_{n-1}x_n}$  is  
 (A)  $\frac{n+1}{x_1}$  (B)  $\frac{n-1}{x_n}$  (C)  $\frac{x_n - x_1}{x_1x_n}$  (D)  $\frac{n+1}{x_1x_n}$

- Q.19** How many four digit numbers are there with distinct digits ?  
 (A) 5016 (B) 4891 (C) 4703 (D) 4536
- Q.20** Between 1 and 31 are inserted  $m$  arithmetic means so that the ratio of the 7<sup>th</sup> and  $(m - 1)$ <sup>th</sup> means is 5 : 9, How many arithmetic mean are inserted ?  
 (A) 6 (B) 12 (C) 14 (D) 20
- Q.21** From the top of a lighthouse, the angles of depression of two ships on the opposite sides of it are observed to be  $\alpha$  and  $\beta$ . If the height of the lighthouse be  $h$  meters and the line joining the ships passes through the foot of the lighthouse, then the distance between the ships is  
 (A)  $\frac{h(\tan \alpha + \tan \beta)}{\tan \alpha \tan \beta}$  m (B)  $\frac{h(\tan \alpha - \tan \beta)}{\tan \alpha \tan \beta}$  m  
 (C)  $\frac{h(\cot \alpha + \cot \beta)}{\tan \alpha \tan \beta}$  (D) None
- Q.22** Find the quadratic equation whose roots are  $\sec^2\theta$  &  $\operatorname{cosec}^2\theta$   
 (A)  $x^2 - x + 1 = 0$  (B)  $x^2 - 2x + 2 = 0$  (C)  $x^2 - 4x + 4 = 0$  (D)  $x^2 - 6x + 6 = 0$
- Q.23** Two persons are '  $a$  ' metres apart and the height of one is double that of the other. If from the middle point of the line joining their feet, an observer finds the angular elevation of their tops to be complementary, then the height of the shorter person in meter is.  
 (A)  $\frac{a}{4}$  (B)  $\frac{a}{\sqrt{2}}$  (C)  $a\sqrt{2}$  (D)  $\frac{a}{2\sqrt{2}}$
- Q.24** Find the sum of the cubes of divisor of 12.  
 (A) 1200 (B) 1498 (C) 1634 (D) 2044
- Q.25** If L.C.M. & H.C.F. of two positive numbers are 175 and 5 respectively. If the sum of the numbers is 60, what is the difference between them ?  
 (A) 10 (B) 20 (C) 30 (D) 40
- Q.26** Find the least number which when divided by 12, 16, 18, 30, leaves remainder 4 in each case but it is completely divisible by 7.  
 (A) 2488 (B) 2484 (C) 2844 (D) 2884
- Q.27** There are 4 numbers. The HCF of each pair is 7 & LCM of all is 1470. What is the product of the 4 numbers.  
 (A) 504210 (B) 502410 (C) 504120 (D) 501420
- Q.28** The value of  $\left(\sqrt[6]{27} - \sqrt[6]{\frac{3}{4}}\right)^2$  is equal to  
 (A)  $\frac{\sqrt{3}}{2}$  (B)  $\frac{3}{2}$  (C)  $\frac{\sqrt{3}}{4}$  (D)  $\frac{3}{4}$
- Q.29** The degree of polynomial  $x^3 x^{-2} + 7$  is .....  
 (A) 3 (B) 1 (C) 0 (D) -2
- Q.30** If one zero of the polynomial  $f(x) = (k^2 + 4)x^2 + 13x + 4k$  is reciprocal of the other, then  $k$  is equal to  
 (A) 2 (B) -2 (C) 1 (D) -1

**Q.31** If  $x = \sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}$ , then  
 (A)  $x = 1$  (B)  $0 < x < 1$  (C)  $x$  is infinite (D)  $1 < x < 2$

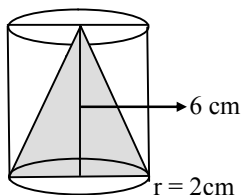
**Q.32** If  $q(x) = 3x^4 - 5x^3 + x^2 + 8$  then find the value of  $q(-1)$   
 (A) 17 (B) 11 (C) 13 (D) 16

**Q.33** If the unit digit in the product  $(129 \times 256 \times 47^* \times 1484)$  is 2, the digit in place of (\*) is  
 (A) 1 (B) 6 (C) 7 (D) 4

**Q.34** The population of the city is 5500 and  $\frac{5}{11}$  th of the population is male and rest of them are female. If the 40% of the male are married, then the percentage of married female in the city is :  
 (A)  $33\frac{1}{3}\%$  (B) 42% (C) 45.5% (D)  $25\frac{1}{2}\%$

**Q.35** Find the value of  $y$  such that  $\sqrt{1 + \sqrt{1 - \frac{2176}{2401}}} = 1 + \frac{y}{7}$   
 (A) (1, -15) (B) (-1, -15) (C) (1, 15) (D) (-1, 15)

**Q.36** The volume of shaded region is



(A)  $8\pi \text{ cm}^3$  (B)  $4\pi \text{ cm}^3$  (C)  $2\pi \text{ cm}^3$  (D)  $12\pi \text{ cm}^3$

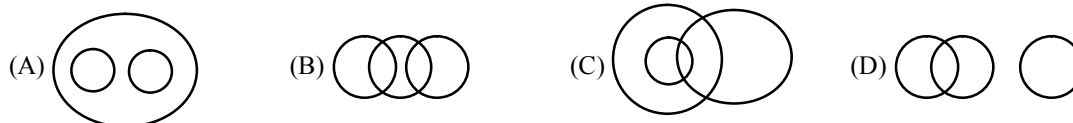
**Q.37** If  $\alpha$  and  $\beta$  are the solutions of the equation  $a \tan\theta + b \sec\theta = c$ , then the value of  $\tan(\alpha + \beta)$  is  
 (A) 0 (B) 1 (C)  $\frac{2ac}{a^2 - c^2}$  (D)  $\frac{c^2}{a^2 + b^2}$

**Q.38** How many terms of the geometric series  $1 + 4 + 16 + 64 + \dots$  will make the sum 5461 ?  
 (A) 6 (B) 7 (C) 8 (D) 9

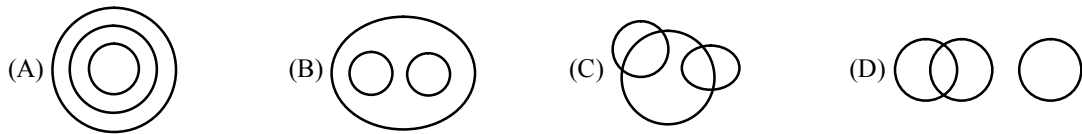
**Q.39** The inverse of  $3 - 2i$  is  
 (A)  $3 + 2i$  (B)  $\frac{3}{13} - \frac{2}{13}i$  (C)  $\frac{3}{13} + \frac{2}{13}i$  (D)  $3 - 2i$

**Q.40** The vertex of  $x^2 + 2y - 3x + 5 = 0$  is  
 (A)  $(3/2, 11/8)$  (B)  $(-3/2, 11/8)$  (C)  $(3/2, -11/8)$  (D)  $(-3/2, -11/8)$

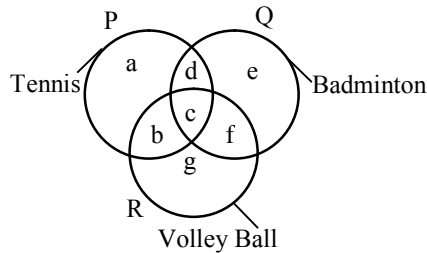
**Q.41** Which of the following diagrams correctly illustrates the relationship among the classes :  
 Elephants, Wolves, Animals ?



**Q.42** Which one of the following Venn diagrams correctly illustrates the relationship among the classes :  
Carrot, Food, Vegetable ?

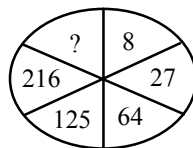


**Directions** (Q. 43 to 45) : The figure given below consists of three intersecting circles which represent sets of students who play Tennis, Badminton and Volley Ball. Each region in the figure is represented by a small letter.



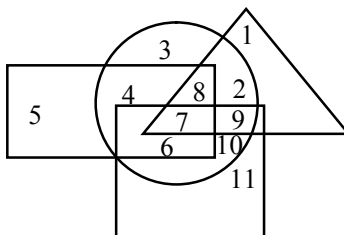
On the basis of the above figure, answer the questions given below.

- Q.43** Which letter represents the set of persons who play all the three games ?  
 (A) b (B) c (C) f (D) g
- Q.44** Which letter represents the set of persons who play Tennis and Volley Ball but not Badminton ?  
 (A) g (B) e (C) c (D) b
- Q.45** Which letter represents the set of persons who play Tennis but neither Badminton nor Volley Ball ?  
 (A) a (B) b (C) c (D) d
- Q.46** Which letter represents the set of persons who play Tennis and Badminton but not Volley Ball ?  
 (A) b (B) c (C) d (D) f
- Q.47** Pineapple is to Jelly as Tomato is to .....?  
 (A) Jam (B) Pury (C) Squash (D) Pickles
- Q.48** Rickets is to Children as Osteomalacia is to.....?  
 (A) Infants (B) Mother (C) Adults (D) Old
- Q.49** Book is to Publisher as Film is to ..... ?  
 (A) Writer (B) Editor (C) Director (D) Producer
- Q.50** Find the missing character in each of the following question



- (A) 4 (B) 305 (C) 343 (D) 729

**Direction : (Q.51 to 55) : In the following figure, rectangle, square, circle and triangle represent the regions of wheat, gram, maize and rice cultivation respectively. On the basis of the above figure, answer the following question.**



- Q.51** Which area is cultivated by all the four commodities ?  
 (A) 7 (B) 8 (C) 9 (D) 2
- Q.52** Which area is cultivated by wheat and maize only ?  
 (A) 8 (B) 6 (C) 5 (D) 4
- Q.53** Which area is cultivated by rice only ?  
 (A) 5 (B) 1 (C) 2 (D) 11
- Q.54** Which area is cultivated by maize only ?  
 (A) 10 (B) 2 (C) 3 (D) 4
- Q.55** Which area is cultivated by rice and maize and nothing else ?  
 (A) 9 (B) 8 (C) 2 (D) 7

**Directions (Questions 56 to 60): Six friends are sitting around a circular table at equal distance from each other. Sita is sitting two places right of Gita who is exactly opposite to Nita. Nita is on immediate left of Lata, who is exactly opposite to Rita. Mita is also sitting at the table.**

- Q.56** Who is the only person sitting between Gita and Sita ?  
 (A) Rita (B) Mita (C) Lata (D) Nita
- Q.57** Sita is not sitting at equal distance from :  
 (A) Rita and Nita (B) Lata and Gita (C) Mita and Lata (D) All of the above
- Q.58** Gita is sitting to the  
 (A) Left of Mita (B) Right of Rita (C) Left of Rita (D) Right of Nita
- Q.59** The angle subtended by Mita and Nita at the centre of the table is :  
 (A)  $60^\circ$  (B)  $120^\circ$  (C)  $90^\circ$  (D)  $180^\circ$
- Q.60** Which of the following statements is not correct ?  
 (A) Mita and Sita are exactly opposite to each other  
 (B) Rita and Mita are equal distance from Gita  
 (C) Angle subtended by Rita and Mita is same as the angle subtended by Sita and Lata at the centre of the table  
 (D) Mita is on the immediate left of Lata