

A d m i s s i o n T e s t 2 0 0 9  
E c o n o m i c s D e p a r t m e n t  
P r e s i d e n c y C o l l e g e , K o l k a t a

*Time: 2 hours*

*No extra answer sheets will be given*

*Full Marks: 100*

G r o u p A : E n g l i s h

- 1. Read the following passage carefully and then answer the question asked below. The answer must be in the candidate's own words but remaining confined to the content of the passage. One can write the answer in Bengali also.**

As human beings, we have a natural need to express our emotions and feelings, whether positive or negative. Interest, enthusiasm, boredom, laughter, empathy, action and curiosity, are expressions of positive emotions. Expressed in their negative forms, they become apathy, grief, fear, hatred, shame, blame, regret, resentment, anger, and hostility. Human minds are like an assembly line of emotions, where there is a continuous production of various emotions. These emotions, if not expressed from time to time, lead to suppression. This has a direct and indirect impact on our health.

We learn to suppress our emotions due to a variety of reasons. Some suppressions are governed by social mores (like passion, excitement), while others could be because of our self imposed limitations. For example we may suppress our anger towards our boss because of fear of losing our jobs. Or, we may suppress our feelings of love for someone because of fear of rejection. Whatever the reason, when we suppress an emotion, the energy of that emotion does not go away. Instead, it remains as pent up energy inside the deeper recesses of our mind. But, by not releasing the emotional energy, we choose to hold it inside, albeit unconsciously.

Emotional suppression causes physical harm, dysfunction and illness. Think of emotion as Energy-in –Motion (EIM). Inhibiting the free flow of emotional energies causes serious damage to our physical, mental, and spiritual aspects. We know the consequence of a balloon that's inflated continuously without any release of filler gas at frequent intervals. The balloon has a limited capacity to swell. Once it reaches fullness any more inflation leads to its rupture. We too have a balloon in our minds that can hold only a limited amount of emotions. Stifling of emotions leads to a gradual build-up towards the holding capacity. This can result in an outburst that can be physically and mentally harmful. [10]

- Q.** Why do people suppress emotions? What could be the consequences of such suppression?

- 2. Write an essay (within a maximum of 600 words) on any one of the following topics:**

A. Sounds I like to hear

B. Protest marches in Kolkata- should they be banned?

[20]

Group B : Mathematics

Full Marks = 70

*Do not detach the question from the answer script*

Section 1 : Multiple choice questions

1. Consider the following two propositions:

I. If A and B are two matrices and  $A \neq 0, B \neq 0$ , then  $A \cdot B \neq 0$

II. If A, B and C are three matrices then  $A \cdot B = A \cdot C \Rightarrow B = C$

State whether

A. only I is true B. only II is true C. both I and II are true D. both I and II are false

2. Find out the coefficient of x in the expression of  $(x^2 + \frac{a^2}{x})^5$

A.  $10a^6$  B.  $5a^3$  C.  $a^4$  D.  $7a^2$

3. In an election, voters are to elect three out of five candidates. The number of votes that each voter can cast is up to the number of candidates to be elected. Find out the number of ways in which a voter can cast his/her vote.

A. 30 B. 18 C. 25 D. 48

4. The radius of a circle is 2.5 cm. The error in the calculated area due to an error of 0.01 cm in the radius is

A. 0.154 sq. cm B. 0.157 sq. cm C. 0.161 sq. cm D. 0.169 sq. cm

5.  $\lim_{x \rightarrow 0} \left\{ \frac{\log_e(1-x)}{x^2} + \frac{x-1}{x} \right\}$  is equal to

A.  $\frac{1}{2}$  B.  $-\frac{1}{2}$  C. 1 D. none of these

6. Let  $f(x) = |x|$  for  $0 < |x| \leq 2$   
 $= 1$  for  $x = 0$

Then at  $x = 0$ ,  $f(x)$  has

A. a local maximum B. no local maximum C. a local minimum D. no extremum

7. Find out the points of contact on the curve  $y = x^2 + 3x + 4$  of the two tangents which pass through the origin are

A. (2,14), (-2,2) B. (2,14), (-2,-2) C. (2,14), (2,2) D. none of these

8. There are 10 lamps in Vivekananda sporting club. Each lamp can be switched on independently. The number of ways in which the club can be lightened to different amounts of illumination is

A.  $10^2$  B. 1023 C.  $2^{10}$  D. 10!

9. The area bounded by the curves  $y = |x| - 1$  and  $y = -|x| + 1$  is  
 A. 3 sq. units      B. 4 sq. units      C. 6 sq. units      D. 2 sq. units
10. Everybody in a room shakes hands with everybody else. The total number of handshakes is 66. The total number of persons in the room is  
 A. 11      B. 12      C. 13      D. 14
11. If  $a, b, c$  are in G. P. and  $a, b, c$  are positive, then the following relation holds  
 A.  $a + c > 2b$       B.  $a + c > b$       C.  $a + b > 2c$       D. none of these
12. The number of odd numbers between 60 and 360 is  
 A. 120      B. 125      C. 150      D. none of these
13. If  $x^y = e^{x-y}$ , then the value of  $\frac{dy}{dx}$  is  
 A.  $\frac{1 - \log x}{\log x}$       B.  $\frac{(1 - \log x)^2}{\log x}$       C.  $\frac{\log x}{(1 - \log x)^2}$       D.  $\frac{1 - \log x}{1 - \log x}$
14. If  $y = x + x^2 + x^3 + \dots$  to  $\infty$ , then  $x$  equals  
 A.  $\frac{y}{y-1}$       B.  $\frac{y-1}{y}$       C.  $\frac{y}{y-1}$       D.  $\frac{y-1}{y}$
15. If  $f(x+y) = f(x) + f(y)$  for all  $x$  and  $y$ , then  
 A.  $f(x)$  is an even function      B.  $f(x)$  is an odd function      C.  $f(x)$  is neither odd nor even function      D.  $f(x)$  is both odd and even function
16. You are to maximize the value of  $f(x, y) = x^2 - y^2$  by choosing a suitable pair of values for  $x$  and  $y$ . If  $x$  and  $y$  must add up to unity the maximum value of  $f(x, y)$  is  
 A. 1      B. -1      C. there is no solution      D. there are multiple solutions
17. At  $x = 0$ ,  $f(x) = |x|$  is  
 A. continuous      B. differentiable      C. continuous and differentiable  
 D. neither continuous nor differentiable
18. By increasing the value of  $x$  we can expect to raise the value of  $f(x)/x$  if  
 A.  $f'(x) > 0$       B.  $f'(x) > f(x)$       C.  $f'(x) > f(x)/x$       D. none of these
19. Salary ( $s$ ) increases at an exponential rate with the years of education ( $t$ ). A possible relationship between  $s$  and  $t$  is  
 A.  $s = e^{\ln e^t}$       B.  $t = e^s$       C.  $s = \ln t$       D. none of these
20. Number of coalitions that can be formed from a set of 12 persons including the coalition where there is no one and the coalition where there is everyone is  
 A.  $12!$       B.  $6!$       C.  $2^{12}$       D. none of these

Answer any six questions

6 x 5 = 30

- (A) Without using the formula for summation, find out the sum of the series  $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots$  upto the  $n^{\text{th}}$  term.

(B) Find the equation of the curve for which the slope of the tangent at any point  $(x, y)$  on it is given by  $\frac{x}{y} - \frac{y}{x} - \frac{1}{y}$  and the curve passes through  $(0, 1)$  point. (2 + 3)
- A body moves along a straight line, straight from the origin with a velocity 10 cms/sec and its acceleration at time  $t$  seconds later is  $(2t^2 - 3t)$  cms/sec<sup>2</sup>. Find its velocity and its distance from the origin after 12 seconds.
- If the roots of the equation  $x^3 - ax^2 + bx - c = 0$  be in harmonic progression, show that the mean root is  $\frac{3c}{b}$ .
- Sambalpur express starts from rest from Howrah station and comes to rest at Dhanbad at a distance  $d$  apart from Howrah. During the first part of its journey it runs with constant acceleration  $f_1$  and the second part with constant retardation  $f_2$ . Show that the time required for the journey is  $\sqrt{\frac{2(f_1 + f_2)d}{f_1 f_2}}$
- It is desired to make an open box with square base out of a square piece of cardboard of side 'a' foot by cutting equal squares out of the corner and then folding the cardboard to form the sides. What must be the length of the side of the square cut out in order that the volume of the box may be maximum ?
- If  $a > 0$ ,  $b < 0$  and  $b^2 = 4ac$ , draw a freehand graph for the function  $f(x) = ax^2 + bx + c$
- If Johora works  $h$  hours a day she earns a daily income  $y$  given by the relation  $y = 20h - h^2$ . If she has 8 hours of work at her disposal in the next two days how should she distribute her working hours between the two days in order to maximize her earning?