

DOVE

TEST-II

14207

SERIES: 11

Test Booklet Serial No.....

Number of Pages: 08

Time Allowed: 3 Hours

Number of Questions: 19

Maximum Marks: 100

The question paper consists of three parts, namely Part A, Part B, and Part C. Use separate answer-sheets to answer Part A, Part B, and Part C. Answer all questions in each part.

PLEASE FILL IN THE FOLLOWING INFORMATION:

Name of the Candidate PIYUSH MATHUR

Roll No. 10379

Centre FAULTY OF MATHEMATICS

Signature of the Candidate 

Invigilator's Signature _____

IMPORTANT

This Booklet contains pages serial numbered 1-8. Before starting the test please check the number of pages and number of questions. Faulty booklet, due to missing pages or missing questions or questions in duplicate or not in serial order or any other discrepancy, should be got replaced immediately by another booklet. No extra time will be given for this.

NOTE: Each question in this part carries 5 marks.

Q.1) If sum of two roots of the equation,

$$4x^4 - 24x^3 + 31x^2 + 6x - 8 = 0 \text{ is } 6,$$

then find all its roots

Q.2) Using matrices, solve the following system of linear equations:

$$x + y - 2z = -4$$

$$3x - 4y + z = 9$$

$$4x + 2y + 3z = 8$$

Q.3) Let $R = \left\{ \begin{bmatrix} p + iq & r + is \\ -r + is & p - iq \end{bmatrix} : p, q, r, s \text{ are any even integers} \right\}$

be a ring w.r.t matrix addition and matrix multiplication. Prove or disprove the following.

- R is a non-commutative ring
- R is a ring with unity
- R has no zero divisors

Q.4) Show that

$$x > \log(1 + x) > \frac{x}{1+x} ; \quad \forall x > 0$$

Q.5) Find the radius of curvature of the cycloid

$$x = a(\theta + \sin \theta) \quad , \quad y = a(1 - \cos \theta) \quad \text{at } \theta'$$

Q.6) Find the area of any one loop of the curve $x^2(x^2 + y^2) = a^2(x^2 - y^2)$

Q.7) Test for the convergence of the following series:

$$1 + \frac{2}{5}x + \frac{6}{9}x^2 + \dots + \frac{2^{n-2}}{2^{n+1}}x^{n-1} + \dots \quad (x > 0)$$

Q.8) Find C (if it exists) of the Lagrange's Mean Value Theorem when the function \mathcal{Q} is given by

$$f(x) = x(x-1)(x-2), \quad x \in \left[0, \frac{1}{2}\right]$$

Q.9) If $u = xy + yz + zx$, $v = x^2 + y^2 + z^2$ and $w = x + y + z$, then show that

$\text{grad } w \cdot (\text{grad } v \times \text{grad } u)$ is independent of x, y, z .

Q.10) Solve the differential equation:

$$(1 + e^{x/y})dx + e^{x/y} \left(1 - \frac{x}{y}\right)dy = 0 \text{ given that } y=1 \text{ when } x=0$$

Q.11) Which conic does the equation $x^2 + 2xy + y^2 - 2x - 1 = 0$ represent?

Also find its vertex, focus and length of the latus rectum.

Q.12) Two spheres of radii r_1 and r_2 intersect orthogonally. Find the radius r of their common circle.

Q.13) A bag contains $2m+1$ coins. It is known that $m+1$ of these coins have a head on both sides and the remaining m coins are fair. A coin is picked up at random and tossed. If the probability that the toss results in a head is $\frac{4}{5}$, then find the value of m .

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PART-B COMMUNICATION SKILLS

In this part read the passages and answer the questions that follow:

Q.14) The word euthanasia is of Greek origin and literally means "a good death." The American Heritage Dictionary defines it as "the act of killing a person painlessly for reasons of mercy." Such killing can be done through active means, such as administering a lethal injection, or by passive means, such as withholding medical care or food and water.

In recent years in the United States, there have been numerous cases of active euthanasia in the news. They usually involve the deliberate killing of ill or incapacitated persons by relatives or friends who plead that they can no longer bear to see their loved ones suffer. Although such killings are a crime, the perpetrators are often dealt with leniently by our legal system, and the media usually portrays them as compassionate heroes who take personal risks to save another from unbearable suffering.

The seeming acceptance of active forms of euthanasia is alarming, but we face a bigger, more insidious threat from passive forms of euthanasia. Every year, in hospitals and nursing homes around the country, there are growing numbers of documented deaths caused by caregivers withholding life-sustaining care, including food and water, from vulnerable patients who cannot speak for themselves.

No one has the right to judge that another's life is not worth living. The basic right to life should not be abridged because someone decides that someone else's quality of life is too low. If we base the right to life on quality of life standards, there is no logical place to draw the line. To protect vulnerable patients, we must foster more positive attitudes towards people with serious and incapacitating illness and conditions. Despite the ravages of their diseases, they are still our fellow human beings and deserve our care and respect. We must also enact positive legislation that will protect vulnerable people from those who consider their lives meaningless or too costly to maintain and who would cause their deaths by withholding life sustaining care such as food and water.

Question

Give possible reasons why someone might disagree with the views expressed by the author. (5)
Restrict your answer to about 50 words.

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Restrict your answer to about 50 words.

Q.15) Russian bears are meant to hibernate in winter and wake up in March. But the weather has been so mild this year that a black bear in St Petersburg zoo has not gone to sleep at all, and a brown bear has already woken up believing its spring. It's the same story in Estonia, the Czech Republic and Slovakia, where hunter's report that one of the warmest winters ever recorded has woken bears several months early.

The polar bears of Arctic, where unusual extreme of temperatures have become commonplace, have to live with reductions in sea ice, which make it difficult to hunt seals - a phenomenon that, experts say, could lead to their extinction. According to climatologists in Scandinavia, Russia, Estonia and Iceland, record or well above average temperatures are being recorded across a great swathe of Scandinavia and northern Europe as balmy winds blow in from the west.

Questions

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Questions

- (A) Which phenomenon could, according to experts lead to the extinction of bears?
- (B) What does the author mean when he says "the weather has been so mild"?
- (C) It is the same story in Estonia. What story is the author talking about?

Restrict your answers to about 30 words.

Q.16) Let us remind ourselves that this "unequal activity" depends entirely on circumstances, and different traits come to the fore in different individuals. Men, when born, come with no habits and behaviour pattern. It is all the "going-on" around him that influence him and he becomes a product of his circumstances.

That makes one feel sure that we are all victims of our habits and circumstances. While circumstances lead us to our developing particular habits and a behavioural pattern, habits from an important factor in changing circumstance.

No wonder, Shakespeare too had this on his mind when he said that circumstances could change one into anything – one could become courteous or quarrelsome, a liar or truthful, as an ass or a nightingale – all depending on one's circumstances.

Do you think Gandhi would have become Gandhi we know today but for the British rule? And similarly, but for the circumstances you were in, you would have been quite another person, different from what you are today.

- (A) What is the author implying, when he says that, "Gandhi would not have become Gandhi we know today but for British rule"? (3)
- (B) What is your opinion about the importance of circumstances? (3)

Restrict your answer to about 30 words.

Q.17) Tsunami is a series of large waves of extremely long wavelength and period usually generated by a violent disturbance or activity near the coast or in the ocean.

Q.17) Tsunami is a series of large waves of extremely long wavelength and period usually generated by a violent, impulsive undersea disturbance or activity near the coast or in the ocean. When a sudden displacement of a large volume of water occurs, or if the sea floor is suddenly raised or dropped by an earthquake, big tsunami waves can be formed by forces of gravity.

By far, the most destructive tsunamis are generated ^B from large, shallow earthquakes with an epicentre or fault line near or on the ocean floor. These usually occur in regions of the earth characterised by tectonic subduction along tectonic plate boundaries. Although relatively infrequent, violent volcanic eruptions represent also impulsive disturbances, which can displace a great volume of water and generate extremely destructive tsunami waves in the immediate source area. Less frequently, tsunami waves can be generated from displacements of water resulting from rock falls, icefalls and sudden submarine landslides or slumps. Major earthquakes are suspected to cause many under-water landslides, which may contribute significantly to tsunami generation. The fall of meteorites or asteroids in the earth's oceans has the potential of generating tsunamis of cataclysmic proportions. Conceivably tsunami waves can also be generated from very large nuclear explosions. However, no tsunami of any significance has ever resulted from the testing of nuclear weapons in the past. Furthermore, such testing is presently prohibited by international treaty.

Questions

- (A) Which testing has been prohibited by the international treaty?
(B) How are most destructive tsunami waves formed?

Restrict your answers to about 30 words.

PART-C

COMPUTER SCIENCE

Q.18) Consider an integer array A of size n . write an algorithm to find the sum of alternate elements in the array e.g. if $A=[0,1,2,3,4,5,6,7,8,9]$, the answer should be 20 ($0+2+4+6+8$)

Q.19) A) Find binary representation of 16.125. Justify.

B) Consider the following calculation in certain base b . $(13)_b \times (6)_b = (71)_b$.
Find out the value of b