



Set No. 1

18P/302/24(i)

02416

Total No. of Printed Pages : 64

Question Booklet No.

(To be filled up by the candidate by blue/black ball-point pen)

Roll No.

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2018

Serial No. of OMR Answer Sheet .....

Centre Code No.

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Day and Date .....

( Signature of Invigilator )

### INSTRUCTIONS TO CANDIDATES

(Use only **blue/black ball-point pen** in the space above and on both sides of the **Answer Sheet**)

1. Within 30 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card*.
3. *A separate OMR Answer Sheet is given. It should not be folded or mutilated. A second OMR Answer Sheet shall not be provided. Only the OMR Answer Sheet will be evaluated.*
4. Write all entries by blue/black pen in the space provided above.
5. *On the front page of the OMR Answer Sheet, write by pen your Roll Number in the space provided at the top and by darkening the circles at the bottom. Also, write the Question Booklet Number, Centre code Number and the Set Number wherever applicable in appropriate places.*
6. *No overwriting is allowed in the entries of Roll No., Question Booklet no. and Set no. (if any) on OMR Answer Sheet and Roll No. and OMR Answer Sheet no. on the Question Booklet.*
7. *Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.*
8. *Each question in this Booklet is followed by four alternative answers. For each question, you are to record the correct option on the OMR Answer Sheet by darkening the appropriate circle in the corresponding row of the OMR Answer Sheet, by pen as mentioned in the guidelines given on the first page of the OMR Answer Sheet.*
9. For each question, darken only one circle on the OMR Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed. If you do not wish to attempt a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).*
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. On completion of the Test, the candidate must handover the OMR Answer Sheet to the Invigilator in the examination room/hall. However, candidates are allowed to take away Test Booklet and copy of OMR Answer Sheet with them.
13. Candidates are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

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**ROUGH WORK**

रफ़ कार्य

**18P/302/24(i)**

**No. of Questions : 240**

**Time : 2 Hours**

**Full Marks : 360**

**Note :** (1) Attempt as many questions as you can. Each question carries 3 **(Three)** marks. **One mark will be deducted for each incorrect answer. Zero** mark will be awarded for each unattempted question.

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

(3) This question paper contains **two** Sections, viz : **Section-A** and **Section-B**. Details of **Section-A** and **Section-B** are as follows :

(a) **Section-A** contains **60** questions from General Science and **20** questions of General Nature.

(b) **Section-B** contains **four** sub-sections namely : **Chemistry, Physics, Biology** and **Mathematics** with **40** questions in each. The candidate has to select **only one** of the **four** sub-sections of **Section-B**.

### **SECTION - A**

**01.** Forensic science is a unique scientific endeavour acceptable to the Court of law having explanation :

- (1) same to conventional field of science
- (2) different to conventional field of science
- (3) same to natural field of science
- (4) different to natural field of science

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- 02.** The preventing/practicing forensics cannot play a role in :
- (1) narco analysis
  - (2) brain/fingerprinting
  - (3) terrorist attack
  - (4) literacy
- 03.** Principle of exchange in forensic investigation means :
- (1) Unilateral exchange of traces by a criminal to object
  - (2) Unilateral exchange of traces by a object to the criminal
  - (3) Mutual exchange of traces by a criminal and a object
  - (4) Mutual exchange of traces between two objects
- 04.** 'Cheiloscopy' is a forensic investigation technique that deals with identification of human based on :
- (1) lip traces
  - (2) voice traces
  - (3) blood traces
  - (4) Gait patterns
- 05.** Which may belong to chemistry division of forensic science ?
- (1) Rape, murder, suicide and drowning
  - (2) Accident cases
  - (3) Food poisoning cases
  - (4) Explosion, arson, fire and acid burn
- 06.** Penile plethysmography technique is used to indentify and evaluate
- (1) Skull and facial imaging
  - (2) Sexual deviance
  - (3) Viscera test
  - (4) Speaker identification.

07. 'Abrasion' is an :

- (1) injury involving loss and damage of internal layer of the skin
- (2) injury involving loss and damage of superficial layer of the skin
- (3) injury involving loss and damage of finger bone
- (4) injury involving loss and damage of leg bone

08 Abortifacient drugs are used to :

- (1) terminate matured pregnancy
- (2) terminate prematured pregnancy
- (3) terminate pregnancy for ever
- (4) terminate pregnancy for a known time

09. 'Algar mortis' is :

- |                          |                      |
|--------------------------|----------------------|
| (1) the body cooling     | (2) the body heating |
| (3) the body decomposing | (4) the body resting |

10 'Ante mortem' is :

- (1) after the death or after the life of an organism
- (2) before the death or during the life of an organism
- (3) at the time when death occurs
- (4) at the time when illness approaches

11. 'Antigen' is :

- (1) a molecule that upon entering the body stimulates a lymphocyte to provoke an immune response
- (2) an act of producing the minimum amount of heat energy in the body
- (3) a large protein molecule produced by the body's immune system
- (4) a DNA system that is used to trace ancestral heritage

12. The vitamin, riboflavin, is also known as :

- (1) Vitamin B<sub>1</sub>
- (2) Vitamin B<sub>2</sub>
- (3) Vitamin B<sub>6</sub>
- (4) Vitamin C

13. A good source of ascorbic acid is :

- (1) meat
- (2) citrus fruits
- (3) lettuce
- (4) coffee

14. Which of the following is a copolymer ?

- (1) Natural rubbers
- (2) Nylon-6,6
- (3) Orlon
- (4) Teflon

15. Which of the following terms is used in the repeating units of a polymer ?

- (1) Unit structure
- (2) Condensation
- (3) Unit residue
- (4) monomer

16. Latex is the source of :

- |                    |              |
|--------------------|--------------|
| (1) cellulose      | (2) nylon    |
| (3) natural rubber | (4) collagen |

17. In which polymer is  $\{\text{CF}_2\text{-CF}_2\}_n$  the repeating unit :

- |               |            |
|---------------|------------|
| (1) Teflon    | (2) Orion  |
| (3) Plexiglas | (4) Lucite |

18. Which of the following is the weaker base ?

- |                 |                  |
|-----------------|------------------|
| (1) methylamine | (2) aniline      |
| (3) piperidine  | (4) acetonitrile |

19. Which holds the two strands of DNA together ?

- |                               |                    |
|-------------------------------|--------------------|
| (1) dipole-dipole interaction | (2) hydrogen bonds |
| (3) vander Waals forces       | (4) ionic bonds    |

20. Radioactivity is the characteristic feature of :

- |             |               |
|-------------|---------------|
| (1) Nucleus | (2) Electrons |
| (3) Protons | (4) Neutrons  |

21. A molecule can be excited to only the next higher rotational level by :

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) absorption of energy    | (2) release of energy       |
| (3) the electric connection | (4) applying magnetic field |



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**22.** Fathometer is used to measure :

- |                 |                     |
|-----------------|---------------------|
| (1) earthquake  | (2) rainfall        |
| (3) ocean depth | (4) sound intensity |

**23.** Exposure to sunlight-helps a person to improve his health because

- (1) the infrared light kills bacteria in the body
- (2) resistance power increases
- (3) the pigment cells in the skin get stimulated and produce a healthy tan
- (4) the ultraviolet rays help in vitamin-D synthesis

**24.** At which particular place on earth are days and nights of equal length always ?

- |                    |              |
|--------------------|--------------|
| (1) Prime Meridian | (2) Poles    |
| (3) Equator        | (4) No where |

**25.** According to WHO, the bird flu virus cannot be transmitted through food cooked above :

- |          |           |
|----------|-----------|
| (1) 60°C | (2) 70°C  |
| (3) 90°C | (4) 100°C |

**26.** Cactus spines are modified :

- |            |              |
|------------|--------------|
| (1) Stems  | (2) branches |
| (3) leaves | (4) roots    |

27. Name the company that has recently created the world's smallest magnet using a single atom which can store one bit of data on it :

- (1) TCS (2) Microsoft  
(3) IBM (4) Infosys

28. Which among the following explains the radiation emitted by black bodies ?

- (1) Big-bang theory (2) Quantum theory  
(3) Piezoelectric effect (4) Beer's law

29. ASCII code is a 7-bit code for :

- (1) letters (2) number  
(3) other symbols (4) all of these

30. Entomology is the science that studies :

- (1) behaviour of human beings  
(2) Insects  
(3) the origin and history of the technical and scientific terms  
(4) the formation of rocks

31. In which layers of the atmosphere is the most weather phenomenon occur ?

- (1) Exosphere (2) Stratosphere  
(3) Ionosphere (4) Troposphere

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**32.** Hereditary information is found in a cell's :

- |                  |                 |
|------------------|-----------------|
| (1) Chloroplasts | (2) Chromosomes |
| (3) Cytoplasm    | (4) membranes   |

**33.** Pituitary : Brain :: Thymus : ?

- |            |                 |
|------------|-----------------|
| (1) Larynx | (2) Spinal cord |
| (3) Throat | (4) Chest       |

**34.** Which type of fire extinguisher is used for petroleum fire ?

- |                    |                 |
|--------------------|-----------------|
| (1) Powder type    | (2) Liquid type |
| (3) Soda acid type | (4) Foam type   |

**35.** Paper is manufactured by :

- (1) Wood and resin
- (2) Wood, sodium and bleaching powder
- (3) Wood, calcium, hydrogen sulphite and resin
- (4) Wood and bleaching powder

**36.** Gravity setting chambers are used in industries to remove :

- (1)  $\text{SO}_2$
- (2)  $\text{NO}_x$
- (3) Suspended particulate matters
- (4) CO

37. Heavy water is :

- (1) deuterium oxide
- (2) pH7
- (3) rain water
- (4) tritium oxide

38. The intersecting lines drawn on maps and globes are :

- (1) latitudes
- (2) Longitudes
- (3) geographic grids
- (4) geographic curves

39. The device converts data from a binary code into telephonic analog signals is called :

- (1) modular
- (2) modem
- (3) electric wire
- (4) magnetic wire

40. Which of the following phenomenon is considered responsible for Global Warming ?

- (1) Greenhouse effect
- (2) Fire in coal mines
- (3) Monsoon
- (4) Trade winds

41. Which among the following of a catalyst does not change at the end of the reaction ?

- (1) Quantity
- (2) Chemical composition
- (3) Both quantity and chemical composition
- (4) surface

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**42.** Which among the following statements about Ozone is incorrect ?

- (1) It is found in the upper atmosphere which filters potentially damaging ultraviolet light from reaching the earth's surface.
- (2) It is lighter than oxygen that is why it is found on the upper atmosphere
- (3) It is an allotrope of oxygen
- (4) Ozone hole is an environmental problem

**43.** How many vertebrae does a human being have ?

- (1) 33
- (2) 36
- (3) 29
- (4) 19

**44.** Who is known as the father of Indian Missile Technology ?

- (1) Dr U.R. Rao
- (2) Dr. A.P.J. Abdul Kalam
- (3) Dr. Chidambaram
- (4) Homi Bhabha

**45.** Bats can fly in the dark because :

- (1) they have better vision in the dark
- (2) the light startles in them
- (3) they produce high pitched sounds called ultrasonics
- (4) they have some vision in the dark

46. An astronaut in outer space will observe sky as :

- |           |           |
|-----------|-----------|
| (1) white | (2) black |
| (3) blue  | (4) red   |

47. It is not advisable to sleep under a tree at night because of release of :

- |                                 |                             |
|---------------------------------|-----------------------------|
| (1) oxygen in a lesser quantity | (2) oxygen in larger amount |
| (3) carbon monoxide             | (4) carbon dioxide          |

48. A universal recipient belongs to the blood group :

- |        |       |
|--------|-------|
| (1) AB | (2) O |
| (3) B  | (4) A |

49. Which of the following disease is **not** caused by virus ?

- |                 |            |
|-----------------|------------|
| (1) Chicken POX | (2) Dengue |
| (3) Cholera     | (4) Polio  |

50. Which one of the following does **not** contain silver ?

- |                   |                   |
|-------------------|-------------------|
| (1) Horn silver   | (2) Ruby silver   |
| (3) Lunar caustic | (4) German silver |

51. The planet nearest to the sun is :

- |             |             |
|-------------|-------------|
| (1) Venus   | (2) Mercury |
| (3) Jupiter | (4) Saturn  |

52. Which of the following makes us know the exact age of a tree ?

- |                        |                          |
|------------------------|--------------------------|
| (1) Height of the tree | (2) Width of the tree    |
| (3) Rings of the tree  | (4) Branches of the tree |

53. Which of the following bacteria is found in Ganga water ?

- |                             |                            |
|-----------------------------|----------------------------|
| (1) Coliform bacteria       | (2) Streptococcus bacteria |
| (3) Staphylococcus bacteria | (4) Diplococcus bacteria   |

54. Which of the following does **not** conduct electricity ?

- |                    |                |
|--------------------|----------------|
| (1) Fused NaCl     | (2) Solid NaCl |
| (3) Brine solution | (4) Copper     |

55. Which part of the eye is adjustable in accordance with the light condition ?

- |           |            |
|-----------|------------|
| (1) Iris  | (2) Retina |
| (3) Pupil | (4) Lens   |

56. If the mass of both bodies is reduced to half, the gravitational force between them becomes :

- |                |                |
|----------------|----------------|
| (1) Double     | (2) Four times |
| (3) One fourth | (4) one-half   |

57. Which colour component of white light is deviated the most through a prism ?
- (1) Red (2) Yellow  
(3) Blue (4) Violet
58. Metal which is a constituent of Haemoglobin is :
- (1) Cu (2) Al  
(3) Zn (4) Fe
59. Hooke's theory is related to :
- (1) Liquid pressure (2) Elasticity  
(3) Radioactivity (4) Viscosity
60. Which radio active isotope is used to control leukemia :
- (1) Phosphorus-32 (2) Cobalt-60  
(3) Iodine-131 (4) Sodium-24
61. In a group of cows and hens the number of legs are 14 more than twice the number of heads. The number of cows is :
- (1) 12 (2) 10  
(3) 7 (4) 5
62. Set of rational numbers is a subset of :
- (1) natural numbers (2) integers  
(3) real numbers (4) irrational numbers



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63. The value of  $\left\{ \frac{(0.1)^2 - (0.01)^2}{0.0001} + 1 \right\}$  is :
- (1) 1010 (2) 100  
(3) 110 (4) 101
64. If  $(a + b)^3 = a^3 + b^3$ , then :
- (1)  $ab > 0$  (2)  $ab < 0$   
(3)  $a = 0$  or  $b = 0$  or  $a = -b$  (4) None of these
65. Let  $m$  and  $n$  are whole numbers. If  $m^n = 121$ , the value of  $n^m$  is :
- (1) 512 (2) 1024  
(3) 2048 (4) 4096
66. The value of  $\sqrt{0.01} + \sqrt{0.81} + \sqrt{1.21} + \sqrt{0.0009}$ , is :
- (1) 2.03 (2) 2.1  
(3) 2.11 (4) 2.13
67. Two numbers are in the ratio 3:5. If 9 is subtracted from each, the new numbers are in the ratio 12:23. The smaller number is :
- (1) 27 (2) 33  
(3) 49 (4) 65
68. BGK is related to AFJ in the same way as PSV is related to :
- (1) ORT (2) ORU  
(3) ROU (4) ORV

69. If A is written as +, E is written -, I as  $\times$  and O as  $\div$  and the consonants B, C, D, F .... are written as 1, 2, 3, 4, .... respectively then FILLER is :

- (1) 396 (2) 382  
(3) 368 (4) 372

70. Find the value  $\sqrt{6+\sqrt{6+\sqrt{6+\dots\dots\dots\infty}}}$  :

- (1) 3 (2) 4  
(3) 5 (4) 6

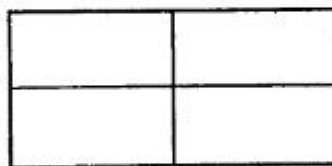
71. The missing term of the sequence 1, 6, 13, ....., 33, 46, is :

- (1) 19 (2) 21  
(3) 24 (4) 22

72. A man is facing north. He turns  $135^\circ$  in the anticlockwise direction and then  $180^\circ$  in the clockwise direction. He is now facing :

- (1) North-East (2) North-West  
(3) South-East (4) South-West

73. How many rectangles are there in the following figure ?



- (1) 4 (2) 6  
(3) 8 (4) 9

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**74.** If the word TERMINATION is coded 12345671586, what should be the code for the word MOTION ?

- |            |            |
|------------|------------|
| (1) 438586 | (2) 458586 |
| (3) 485186 | (4) 481586 |

**75.** To print a document :

- (1) Select the Print command and then select OK
- (2) Select the Ready printer command and then select OK
- (3) type PRINT and the press Enter
- (4) close the document, select the Print command and then select OK

**76.** In how many different ways can be letters of the word 'TRENDS' be arranged ?

- |         |          |
|---------|----------|
| (1) 720 | (2) 120  |
| (3) 740 | (4) 5040 |

**77.** The perimeter of a circle is equal to the perimeter of a square. Then their areas are in the ratio : (use  $\pi = \frac{22}{7}$ )

- |           |          |
|-----------|----------|
| (1) 4:1   | (2) 11:7 |
| (3) 14:11 | (4) 22:7 |

78. ₹58,750 amounts to ₹79,900 in four years at simple interest. What is the rate of the interest paid ?
- (1) 14 (2) 13  
(3) 9 (4) 16
79. How many meaningful words (not ending with S), can be made with the alphabets A, D, and S, each being used only once in each word ?
- (1) None (2) One  
(3) Two (4) Three
80. If  $\odot$  denotes '-' and  $\Delta$  denotes '+', what will be the value of  $94 \Delta 27 \odot 44 \odot 56 \Delta 20$  ?
- (1) 41 (2) 45  
(3) 47 (4) 48

**SECTION - B**  
**(CHEMISTRY)**

81. Ligand field theory is different from crystal field theory in respect of the following :
- (1) Ligand field theory considers partial covalent character of metal-ligand bond.
  - (2) Ligand field theory considers ionic character of metal - ligand bond.
  - (3) Ligand field theory considers 100% covalent character of metal-ligand bond.
  - (4) Ligand field theory considers no interaction between metal and ligand.
82. Crystal field stabilization energy for  $\text{ReF}_6$  showing crystal field splitting energy of  $32500 \text{ cm}^{-1}$  is :
- |                  |                  |
|------------------|------------------|
| (1) 37.37 k cal  | (2) 37.037 k cal |
| (3) 27.037 k cal | (4) 37.027 k cal |
83.  $\text{V}_2\text{O}_5$  (vanadium pentoxide) is used as a catalyst :
- (1) for the manufacture of  $\text{H}_2\text{SO}_4$
  - (2) to decompose  $\text{KClO}_3$  to give  $\text{O}_2$
  - (3) in production of  $\text{CCl}_4$  from  $\text{CS}_2$  and  $\text{Cl}_2$ .
  - (4) for hydrogenation of phenol to cyclohexanone.

84. On the basis of shape of (a)  $\text{XeOF}_4$ , (b)  $\text{PCl}_5$ , (c)  $\text{XeO}_3$  and (d)  $\text{NH}_3$ , which one of the following is correct ?
- (1) a and b have square pyramidal and trigonal bipyramidal shape, respectively.
  - (2) a and b have trigonal bipyramidal and square pyramidal shape, respectively.
  - (3) a and c have pyramidal and square pyramidal shape, respectively.
  - (4) b and d have pyramidal and trigonal bipyramidal shape, respectively.
85. Which one of the following is peroxo acid ?
- (1)  $\text{H}_2\text{SO}_4$
  - (2)  $\text{H}_2\text{S}_2\text{O}_4$
  - (3)  $\text{H}_2\text{SO}_5$
  - (4)  $\text{H}_2\text{S}_2\text{O}_7$
86. Which one of the following is a stable free radical ?
- (1)  $\text{NO}$
  - (2)  $\text{NO}^-$
  - (3)  $\text{NO}^+$
  - (4)  $\text{N}_2\text{O}_2$
87. In a qualitative test of fluoride, when salt/mixture is heated with  $\text{SiO}_2$  and conc.  $\text{H}_2\text{SO}_4$  in a test tube and a moistened glass rod is brought to mouth of the test tube, white solid deposited on glass rod is :
- (1)  $\text{H}_2[\text{SiF}_6]$
  - (2)  $\text{SiF}_4$
  - (3)  $\text{HF}$
  - (4)  $\text{SiO}_2$

88. Which one of the following has no donor properties ?

- |                   |                   |
|-------------------|-------------------|
| (1) $\text{NF}_3$ | (2) $\text{PF}_3$ |
| (3) $\text{NH}_3$ | (4) $\text{PH}_3$ |

89. Marcasite is an ore of :

- |        |        |
|--------|--------|
| (1) Hg | (2) Cu |
| (3) Zn | (4) Fe |

90. Which one of the following is **not** diamagnetic and has no metal-metal bond ?

- |  |  |
|--|--|
| (1) $\text{Cr}_2(\text{CH}_3\text{COO})_4(\text{H}_2\text{O})_2$ | (2) $\text{Cu}_2(\text{CH}_3\text{COO})_4(\text{H}_2\text{O})_2$ |
| (3) $\text{Mo}_2(\text{CH}_3\text{COO})_4(\text{H}_2\text{O})_2$ | (4) $\text{Re}_2\text{Cl}_8^{2-}$                                |

91. The rotational constant (B) of gaseous HCl is  $10.59 \text{ cm}^{-1}$ . The ratio of the rotational partition functions of HCl at 100 K and 500 K is :

- |         |         |
|---------|---------|
| (1) 0.2 | (2) 0.5 |
| (3) 2   | (4) 5   |

92. The liquid pair having both upper critical solution temperature and lower critical solution temperature is :

- |                         |                    |
|-------------------------|--------------------|
| (1) Phenol-water        | (2) Aniline-hexane |
| (3) Triethylamine-water | (4) Nicotine-water |



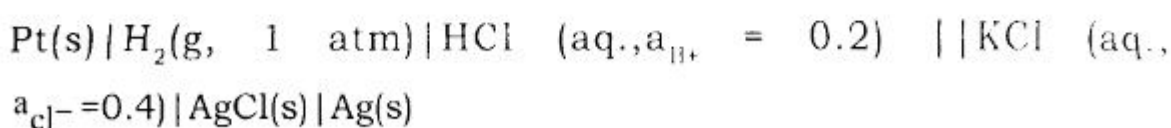


**18P/302/24(i)**

**97.** The translational molecular partition function of a He atom at 298 K in a container of volume  $1.00 \text{ m}^3$  is :

- (1)  $1.25 \times 10^{31}$  (2)  $7.75 \times 10^{30}$   
(3)  $5.5 \times 10^{29}$  (4)  $2.25 \times 10^{28}$

**98.** Calculate the e.m.f.(V) of the following cell :



Given : Standard cell potential,  $E_{\text{cell}}^0 = 0.222 \text{ V}$  at 298 K and  $\log_{10} 2 = 0.301$

- (1) 0.487 (2) 0.378  
(3) 0.287 (4) 0.178

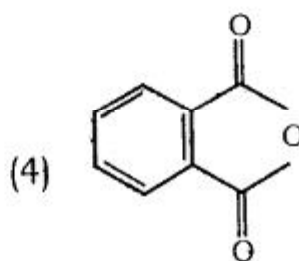
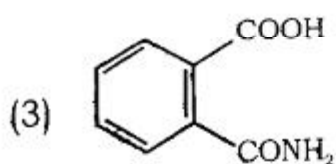
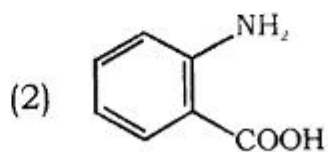
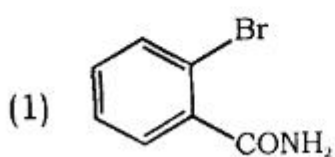
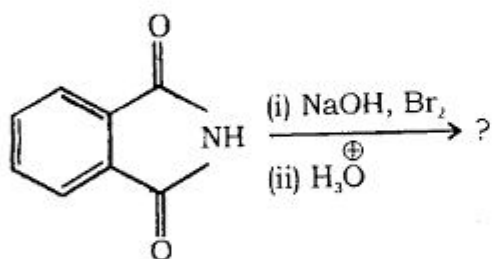
**99.** The ratio of the distances from the origin among the three planes with Miller indices of (100),(110) and (111) in a cubic lattice is :

- (1)  $\sqrt{6} : \sqrt{3} : \sqrt{2}$  (2) 1 : 2 : 3  
(3)  $\sqrt{3} : \sqrt{2} : \sqrt{1}$  (4)  $\sqrt{2} : \sqrt{3} : \sqrt{6}$

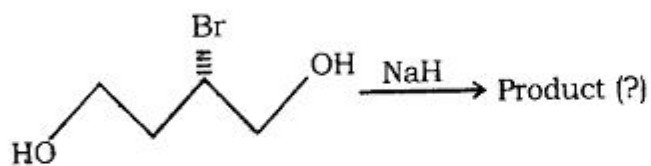
**100.** The specific conductance of a saturated solution of  $\text{CaF}_2$  at  $25^\circ\text{C}$  after subtracting the specific conductance of water is  $4.05 \times 10^{-3} \text{ S m}^{-1}$ . Assuming  $A_m^0(\text{CaF}_2) = 200 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$ , the solubility product of  $\text{CaF}_2$  (in  $\text{mol}^3 \text{ dm}^{-9}$ ) will be :

- (1)  $3.32 \times 10^{-7}$  (2)  $3.32 \times 10^{-9}$   
(3)  $3.32 \times 10^{-11}$  (4)  $1.16 \times 10^{-9}$

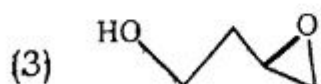
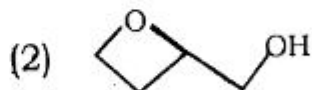
101. The major product resulting in the given below reaction is :



102. In the following cyclization reaction :

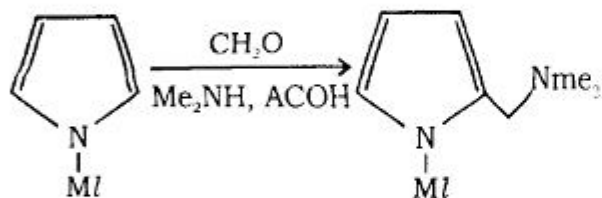


The major reaction product is :



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103. The following conversion is an example of :

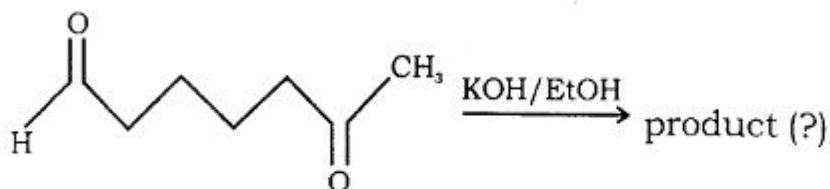


- (1) Chichibabin Amination reaction
- (2) Arndt-Eistert Homologation
- (3) Michel Addition
- (4) Monnich reaction

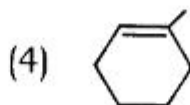
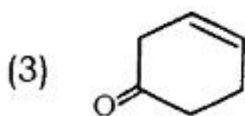
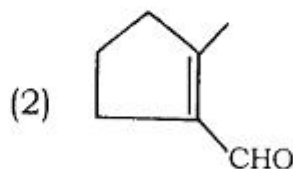
104. The compound that can be used as a formyl anion equivalent (in the presence of strong base) is :

- |                  |                  |
|------------------|------------------|
| (1) Ethylene     | (2) Nitroethane  |
| (3) 1,3-dithiane | (4) 1,4-dithiane |

105. In the following reaction :



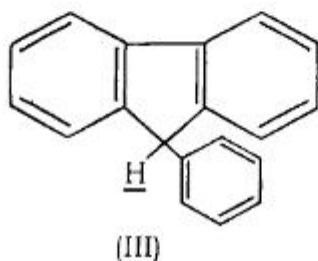
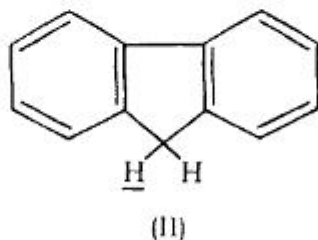
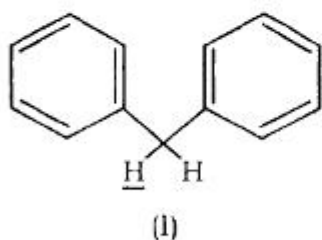
The Product obtained is :





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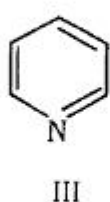
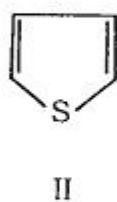
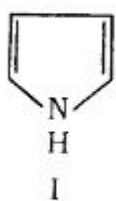
109. The decreasing order of acidity of the marked H (hydrogen) of the following molecules is :



- (1) III > II > I  
(3) I > II > III

- (2) III > I > II  
(4) I > III > II

110. The decreasing order of the reactivity of the following compounds towards electrophiles is :



- (1) II > I > III  
(3) III > I > II

- (2) II > III > I  
(4) I > II > III

111. The criteria for selection of an acid-base indicator is :

- (1)  $\text{pH} = \text{pK}_{\text{in}}$  (2)  $\text{pH} = \text{pK}_{\text{in}} \pm 1$   
 (3)  $\text{pH} = \frac{1}{\text{pk}_{\text{in}}}$  (4)  $\text{pH} = 1 - \text{pK}_{\text{in}}$

112. The salt of a weak acid and a weak base is :

- (1) Neutral (2) Strong acid  
 (3) Strong base (4) Weak acid

113. Which of the following reagents is used as source of molecular bromine ?

- (1) Potassium bromate  
 (2) Potassium bromide  
 (3) Potassium bromate + Potassium bromide  
 (4) Hydrobromic acid

114. Which of the following reagents is used for determination of moisture in a sample ?

- (1) Malaprade reagent (2) Oxine  
 (3) Chloramine-T (4) Karl-Fischer reagent

115. Which of the following relationships is used to convert potentials *versus* SCE to the corresponding potentials *versus* NHE, and *vice versa* ?

- (1)  $E_{\text{vs SCE}} = E_{\text{vs NHE}} + 0.242$  (2)  $E_{\text{vs SCE}} = E_{\text{vs NHE}} - 0.242$   
 (3)  $E_{\text{vs NHE}} = E_{\text{vs SCE}}$  (4)  $E_{\text{vs NHE}} = 1/E_{\text{vs SCE}}$



120. Handerson - Hasselbalch equation is :

$$(1) \quad pK_a = p^H + \log \frac{[\text{acid}]}{[\text{conjugated base}]}$$

$$(2) \quad pK_a = p^H + \log \frac{[\text{conjugated acid}]}{[\text{Base}]}$$

$$(3) \quad p^H = pK_a + \log \frac{[\text{conjugated base}]}{[\text{acid}]}$$

$$(4) \quad p^H = pK_a + \log [\text{acid}] [\text{conjugated base}]$$



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**SECTION - B**  
**(PHYSICS)**

**121.** If the error in the measurement of the momentum of a particle is (+ 100%), then the error in the measurement of *kinetic energy* is :

- |           |           |
|-----------|-----------|
| (1) 400 % | (2) 300 % |
| (3) 100 % | (4) 200 % |

**122.** A car travels first half of the distance between two places with a speed of 30km/hr and the remaining half with a speed of 50km/hr. The average speed of the car is :

- |                |                |
|----------------|----------------|
| (1) 45 Km/hr   | (2) 42.8 Km/hr |
| (3) 37.5 Km/hr | (4) 48 Km/hr   |

**123.** Which of the following particle is responsible for carrying away the missing energy and momentum in a nuclear decay process ?

- |                        |              |
|------------------------|--------------|
| (1) $\alpha$ -particle | (2) Neutrino |
| (3) Lepton             | (4) Proton   |

**124.** A bread gives a boy of mass 40kg an energy of 21kJ. If the efficiency is 28% then the height can be climbed by him using this energy is :

- |            |          |
|------------|----------|
| (1) 22.5 m | (2) 15 m |
| (3) 10 m   | (4) 5 m  |

















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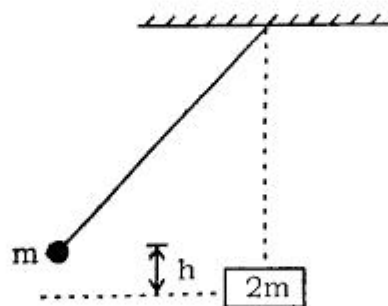
155. A temperature difference of 5 K is equal to :

- (1) a difference of 7.6 on the Celsius scale
- (2) a difference of 9.0 on the Fahrenheit scale
- (3) a difference of 2.8 on the Rankine scale
- (4) a difference of 6.5 on the Fahrenheit scale

156. At what depth under the earth's surface, the value of acceleration due to gravity will reduce by 1% with respect to that on the earth's surface ?

- (1) 75 km
- (2) 75 m
- (3) 75.5 m
- (4) 64 km

157. As shown in the picture, a ball of mass  $m$ , suspended on the end of a wire, is released from height  $h$  and collides *elastically*, when it is at its lowest point, with a block of mass  $2m$  at rest on a frictionless surface. After the collision, the ball rises to a final height equal to



- (1)  $1/7 h$
- (2)  $1/9 h$
- (3)  $1/5 h$
- (4)  $1/8 h$



**SECTION - B**  
**(BIOLOGY)**

**161.** Basic unit of classification is :

- |             |             |
|-------------|-------------|
| (1) Variety | (2) Species |
| (3) Genus   | (4) Family  |

**162.** Decreased B.O.D. of the pond is an indication of :

- (1) High O<sub>2</sub> content
- (2) High microbial activity
- (3) Low microbial activity
- (4) High CO<sub>2</sub> content

**163.** Pneumatophores are found in :

- |                 |                |
|-----------------|----------------|
| (1) Hydrophytes | (2) Mangroves  |
| (3) Xerophytes  | (4) Bryophytes |

**164.** Golden rice is rich source of :

- |                |                |
|----------------|----------------|
| (1) Vitamin -A | (2) Vitamin -C |
| (3) Vitamin -D | (4) Vitamin -E |

**165.** Core metal of chlorophyll is :

- |        |        |
|--------|--------|
| (1) Fe | (2) Mg |
| (3) Zn | (4) Ni |

166. Tetradynamous stamens are found in the family :

- |                  |                |
|------------------|----------------|
| (1) Solanaceae   | (2) Asteraceae |
| (3) Brassicaceae | (4) Malvaceae  |

167. Which one of the following is correct for family Asteraceae :

- |                        |                        |
|------------------------|------------------------|
| (1) Inferiour ovary    | (2) Hypogynous flower  |
| (3) Axile placentation | (4) Multilocular ovary |

168. Opium is extracted from which part of *Papaver somniferum* :

- |                   |                    |
|-------------------|--------------------|
| (1) Mature leaves | (2) Bark           |
| (3) Ripe capsule  | (4) Unripe capsule |

169. Polyembryony was first discovered in :

- |               |                   |
|---------------|-------------------|
| (1) Orchids   | (2) <i>Pinus</i>  |
| (3) Mangroves | (4) <i>Citrus</i> |

170. Gynobasic style is found in family :

- |                   |                       |
|-------------------|-----------------------|
| (1) Ranunculaceae | (2) Lamiaceae         |
| (3) Asteraceae    | (4) Schrophulariaceae |

171. Which of the following plant is known for anther culture :

- |                                 |                           |
|---------------------------------|---------------------------|
| (1) <i>Rauwolfia serpentina</i> | (2) <i>Solanum nigrum</i> |
| (3) <i>Datura innoxia</i>       | (4) <i>Nerium indicum</i> |

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**172.** Myrosin glands are found in family :

- |                  |                |
|------------------|----------------|
| (1) Brassicaceae | (2) Solanaceae |
| (3) Rubiaceae    | (4) Asteraceae |

**173.** Which enzyme is used as molecular scissor in genetic engineering ?

- |              |                              |
|--------------|------------------------------|
| (1) Helicase | (2) Polymerase               |
| (3) Ligase   | (4) Restriction endonuclease |

**174.** Reserpene drug is extracted from which part of *Rauwolfia serpentina*?

- |           |            |
|-----------|------------|
| (1) Bark  | (2) Leaves |
| (3) Roots | (4) Fruits |

**175.** Which of the following step in transcription is catalysed by RNA polymerase ?

- (1) Initiation
- (2) Elongation
- (3) Termination
- (4) Both Initiation and termination

**176.** 'Western Ghats' of India is known for ?

- |                      |                           |
|----------------------|---------------------------|
| (1) Temperate forest | (2) Dry deciduous forest  |
| (3) Alpine forest    | (4) Humid tropical forest |

177. Link between glycolysis and Krebs's cycle is :

- |                   |                  |
|-------------------|------------------|
| (1) Acetyl CO-A   | (2) Citric acid  |
| (3) Succinic acid | (4) Fumaric acid |

178. CO<sub>2</sub> fixation in C<sub>4</sub> plants occurs in :

- |                         |                       |
|-------------------------|-----------------------|
| (1) Bundle sheath cells | (2) Guard cells       |
| (3) Mesophyll cells     | (4) Spongy pavenchyma |

179. Which of the following is a Bryophyte :

- |                   |               |
|-------------------|---------------|
| (1) Bog Moss      | (2) Club Moss |
| (3) Reindeer Moss | (4) Iris Moss |

180. Milky water of coconut fruit is :

- (1) Liquid chalaza
- (2) Liquid nucellus
- (3) Liquid nuclear endosperm
- (4) Liquid female gametophyte

181. What organelle processes and packages proteins before sending them out of cell during secretion ?

- |                                |                           |
|--------------------------------|---------------------------|
| (1) Outer memberane of nucleus | (2) Endoplasmic reticulum |
| (3) Golgi complex              | (4) Plasma membrane       |

**18P/302/24(i)**

**182.** Which of the following cell organelle is associated with a protein skeleton composed of lamins ?

- (1) Mitochondrion
- (2) Chloroplast
- (3) NOR
- (4) Nucleus

**183.** In which phase of cell cycle DNA becomes 4C from 2C ?

- (1) S
- (2) G1
- (3) Metaphase
- (4) Anaphase

**184.** In hybridization experiments, high stringency washing means washing in presence of :

- (1) Low salt concentration and high temperature
- (2) High salt concentration and high temperature
- (3) High salt concentration and low temperature
- (4) Only water

**185.** If you wish to study the region of binding of a transcription factor in promoter DNA which of the following technique will be most appropriate ?

- (1) Microarray
- (2) Immunoprecipitation
- (3) Chromosome walking
- (4) DNA footprinting

186. Which one of the following cell type does not divide in adult organisms ?

- (1) Primary germ cell
- (2) Neuron
- (3) Intestinal epithelium
- (4) Corneal epithelium

187. Polysomes are many :

- (1) Ribosomes attached to an individual mRNA
- (2) Chain of nucleosomes forming chromatin
- (3) Several lysosomes fusing during phagocytosis
- (4) Centrosomes clustering during mitotic division

188. During meiosis when does a cell actually become haploid ?

- (1) At the end of second division
- (2) During recombination in pachytene
- (3) During chiasmata terminalization at diakinesis
- (4) At the end of first division

189. Which one of the following organelles is rich in acid hydrolases ?

- (1) Lysosomes
- (2) Golgi complex
- (3) Peroxisomes
- (4) Rough endoplasmic reticulum



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**190.**Most of the membrane lipids are synthesized on :

- (1) Rough endoplasmic reticulum
- (2) Nucleolus
- (3) Smooth endoplasmic reticulum
- (4) Nucleus

**191.**The dorsal-most vegetal cells of amphibian blastula capable of inducing the organizer is called as :

- (1) Dorsal lip
- (2) Nieuwkoop centre
- (3) Dorsal marginal zone
- (4) Primary organizer

**192.**The first set of genes to be activated for axis specification of *Drosophila* is during early embryonic development is :

- (1) Gap genes
- (2) Pair rule gene
- (3) Homeotic genes
- (4) Segment polarity genes

**193.**During gastrulation the movement of ectodermal cells to cover the entire embryo is known as ;

- (1) Epiboly
- (2) Delamination
- (3) Ingression
- (4) Invagination

**194.**Acrosomal vesicle in a mature sperm is derived from :

- (1) Endoplasmic reticulum
- (2) Golgi complex
- (3) Lysosomes
- (4) Mitochondria

**195.** If you need to prepare 5M NaCl (MW 58.4), you will dissolve :

- (1) 1 gm of NaCl in a total volume of 100 ml of water
- (2) 1 gm of NaCl in a total volume of 1000 ml of water
- (3) 58.4 gm of NaCl in a total volume of 200 ml of water
- (4) 5.84 gm of NaCl in a total volume of 100 ml of water

**196.** If a sample of DNA is found to have the base composition (mole ratios) of adenine, 40; thymine, 22; guanine, 21; and cytosine 17, which of the following conclusions will be most appropriate ?

- (1) The given DNA is a double stranded circular molecule
- (2) It is a linear double stranded molecule
- (3) It is a single stranded molecule
- (4) It has high melting point

**197.** Pearl is formed in oysters :

- (1) In the shell following the entry of an irritant
- (2) By the mantle
- (3) Between the mantle and inner body
- (4) By calcium carbonate deposition at any site

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**198.** Which of the following group of organisms does not have bilateral symmetry ?

- |                     |                          |
|---------------------|--------------------------|
| (1) Platyhelminthes | (2) Mollusca             |
| (3) Cnideria        | (4) Echinodermata larvae |

**199.** Which of the following groups of animals does not come under deuterostomes ?

- |                   |                   |
|-------------------|-------------------|
| (1) Chordata      | (2) Arthropoda    |
| (3) Protochordata | (4) Echinodermata |

**200.** In coelomates, the body cavity is lined by :

- |              |              |
|--------------|--------------|
| (1) Ectoderm | (2) Mesoderm |
| (3) Endoderm | (4) Coelom   |

**SECTION - B**  
**(MATHEMATICS)**

201. Consider the function :

$$f(x) = \begin{cases} x, & \text{if } x \text{ is rational} \\ 0, & \text{if } x \text{ is irrational} \end{cases}$$

Then  $f$  is

- (1) differentiable at  $x = 0$  with derivative 0
- (2) not differentiable but continuous at  $x = 0$
- (3) not continuous but limit at  $x = 0$  exists
- (4) limit of the function at  $x = 0$  does not exist

202.  $\lim_{(x,y) \rightarrow (0,0)} \frac{2xy^2}{x^2 + y^4}$

- |                     |                     |
|---------------------|---------------------|
| (1) does not exist  | (2) exists and is 2 |
| (3) exists and is 1 | (4) exists and is 0 |

203. For the function :

$$f(x,y) = \begin{cases} \frac{xy}{\sqrt{x^2 + y^2}}, & \text{when } (x,y) \neq (0,0) \\ 0 & \text{,when } (x,y) = (0,0) \end{cases}$$

which of the following is **not** true :

- (1)  $f_x(0,0)$  exists
- (2)  $f_y(0,0)$  exists
- (3)  $f$  is differentiable at  $(0,0)$
- (4)  $f$  is not differentiable at  $(0,0)$

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204. The sequence  $\left\{a_n = \left(1 + \frac{1}{n}\right)^n\right\}$  is :

- (1) monotone decreasing and bounded
- (2) monotone but limit does not exist
- (3) monotone increasing bounded and limit exists
- (4) not monotone

205. Which of the following functions satisfies the conditions of Rolle's theorem in  $[-1, 1]$  ?

- (1)  $|x|$
- (2)  $\frac{1}{x^2}$
- (3)  $x$
- (4)  $x^2$

206. If Cauchy's mean value theorem is applied to the functions  $f(x) = x^2$  and  $g(x) = x$ , in  $[-1, 1]$ , then  $c$  is equal to :

- (1) 1
- (2) 0
- (3) -1
- (4)  $\frac{1}{2}$

207. The function  $f(x) = \begin{cases} \frac{x^2}{|x|}, & x \neq 0 \\ 0, & x = 0 \end{cases}$  is :

- (1) Continuous and differentiable at  $x = 0$
- (2) Continuous but not differentiable at  $x = 0$
- (3) differentiable but not continuous at  $x = 0$
- (4) neither continuous nor differentiable at  $x = 0$

208. The remainder, when  $Z^{2018}$  is divided by 31, is :

- (1) 6 (2) 7  
(3) 8 (4) 11

209. The rank of the matrix  $\begin{bmatrix} 1 & 2 & 3 \\ \lambda & 2 & 3 \\ 2 & -3 & 1 \end{bmatrix}$  is less than 3 if :

- (1)  $\lambda = \frac{18}{11}$  (2)  $\lambda = \frac{11}{18}$   
(3)  $\lambda = \frac{-18}{11}$  (4)  $\lambda = \frac{-11}{18}$

210. The domain of the function  $f(x) = \frac{1}{\sqrt{3x - x^2 - 2}}$  is :

- (1) [1, 2] (2) (1, 2)  
(3) (-2, -1) (4) (2,  $\infty$ )

211. The partial differential equation obtained by eliminating the arbitrary function  $f$  from  $z = f(x^2 - y^2)$  is :

- (1)  $x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y} = 0$  (2)  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 0$   
(3)  $y \frac{\partial z}{\partial x} - x \frac{\partial z}{\partial y} = 0$  (4)  $y \frac{\partial z}{\partial x} + x \frac{\partial z}{\partial y} = 0$

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212. Complete integral of partial differential equation  $z = \frac{\partial z}{\partial x} \cdot \frac{\partial z}{\partial y}$ , is :

- (1)  $z = (x + a)(y + b)$                       (2)  $z = (x + a)^3 + (y + b)^3$   
(3)  $z = (x + a)^2 + (y + b)^2$               (4)  $z = (x + a) + (y + b)$

213. The general solution of the partial differential equation  $\frac{\partial^4 z}{\partial x^4} - \frac{\partial^4 z}{\partial y^4} = 0$  is :

- (1)  $z = \phi_1(x - y) + x \phi_2(x - y) + \phi_3(x + y) + x \phi_4(x + y)$   
(2)  $z = \phi_1(y - x) + \phi_2(x + y) + \phi_3(y - ix) + \phi_4(y + ix)$   
(3)  $z = \phi_1(y + x) + x \phi_2(y + x) + x^2 \phi_3(y + x) + x^3 \phi_4(x + y)$   
(4)  $z = \phi_1(y - x) + x \phi_2(y - x) + x^2 \phi_3(y - x) + x^3 \phi_4(y - x)$

214. The partial differential equation :

$$2 \frac{\partial^2 u}{\partial x^2} + 4 \frac{\partial^2 u}{\partial x \partial y} + 3 \frac{\partial^2 u}{\partial y^2} = 4 \text{ is :}$$

- (1) Hyperbolic                                      (2) Parabolic  
(3) Elliptic    (4) none of these

215. A particle is falling under gravity between two points A and B lying in a vertical plane but not in the same vertical line. The curve described by the particle from A to B in shortest time is are of a :

- (1) cycloid    (2) circle  
(3) parabola    (4) hyperbola

**216.** If one member of a coplanar system of forces has components (2,3) along the axes of coordinates and acts at the point (4,5) then its moment about the point (2,3) is :

- |       |        |
|-------|--------|
| (1) 1 | (2) -1 |
| (3) 2 | (4) -2 |

**217.** If a particle at the point (4,5) is displaced to the point (6,6) under the application of the force (1,-2) then the work done by the force during the displacement is :

- |        |       |
|--------|-------|
| (1) -2 | (2) 0 |
| (3) 2  | (4) 4 |

**218.** If the radial and transverse velocities of a particle are always proportional to each other then the particle moves in :

- (1) a parabola
- (2) an equilateral hyperbola
- (3) a cardioid
- (4) an equiangular spiral



**18P/302/24(i)**

**219.** If a particle describes uniformly a given straight line then its angular velocity about a fixed point varies as ;

- (1)  $r$       (2)  $1/r$       (3)  $r^2$       (4)  $1/r^2$

where  $r$  is the distance of the particle from the fixed point.

**220.** A particle is projected from the lowest point with velocity  $u$  and moves along the inside of a smooth vertical circle of radius  $r$ . If the particle oscillates through a quadrant on each side of the vertical through the lowest point then :

- (1)  $u^2 < 2gr$       (2)  $u^2 > 2gr$   
(3)  $u^2 = gr$       (4)  $u^2 = 2gr$

**221.** The equation of the plane through the points  $(1,0,1)$ ,  $(1,2,3)$  and perpendicular to the plane  $2x + 3y - z = 3$ , is :

- (1)  $2x - y - z = 1$       (2)  $2x - y + z = 3$   
(3)  $2x - 3y + 3z = 5$       (4)  $x - y + z = 2$

222. If the lines  $\frac{x}{1} = \frac{y-1}{2} = \frac{z-4}{4}$  and  $\frac{x-\lambda}{2} = \frac{y-1}{1} = \frac{z-2}{3}$  are coplanar, then the value of  $\lambda$  is :

- (1) -3 (2) -2  
(3) 3 (4) 1

223. The angle between the line  $\frac{x-2}{5} = \frac{y-1}{-4} = \frac{z-5}{2}$  and the plane  $4x + 2y = 1$ , is :

- (1)  $\cos^{-1}(\frac{2}{5})$  (2)  $\sin^{-1}(\frac{2}{5})$   
(3)  $\cos^{-1}(\frac{1}{5})$  (4)  $\sin^{-1}(\frac{1}{5})$

224. If the plane  $x + y + z = a$  touches the sphere  $x^2 + y^2 + z^2 - 2x - 2y - 2z - 6 = 0$  then the value of  $a$  is :

- (1)  $2(1 \pm \sqrt{2})$  (2)  $2(1 \pm \sqrt{3})$   
(3)  $3(1 \pm \sqrt{2})$  (4)  $3(1 \pm \sqrt{3})$

225. If the cone  $2x^2 - 3y^2 + cz^2 + 4yz - 8zx + 2xy = 0$  has three mutually perpendicular generators, then the value of  $c$  is :

- (1) 0 (2) -1  
(3) 1 (4) 2

226. Arc-length of the curve  $\gamma(t) = (e^t \cos t, e^t \sin t)$  starting at the point  $(1, 0)$  is :

- (1)  $\sqrt{2}(e^t + 1)$  (2)  $\sqrt{3}(e^t - 1)$   
(3)  $\sqrt{3}(e^t + 1)$  (4)  $\sqrt{2}(e^t - 1)$

227. Curvature of the curve  $\gamma(t) = (\frac{4}{5} \cos t, 1 - \sin t, -\frac{3}{5} \cos t)$ , is :

- (1) 0 (2) -1  
 (3) 1 (4) 2

228. Which of the following curve  $\gamma$  is not regular ?

- (1)  $\gamma(t) = (2t^2 + 3, 4t^3)$  (2)  $\gamma(t) = (t, t^2)$   
 (3)  $\gamma(t) = (t, \cos h t)$  (4)  $\gamma(t) = (5t, 3t^2)$

229. If  $\vec{a}(x,y,z)$  and  $\vec{b}(x,y,z)$  are two differentiable vector functions, then :

- (1)  $\text{div}(\vec{a} \times \vec{b}) = \vec{a} \cdot \text{curl} \vec{b} - \vec{b} \cdot \text{div} \vec{a}$   
 (2)  $\text{div}(\vec{a} \times \vec{b}) = \vec{b} \cdot \text{curl} \vec{a} - \vec{a} \cdot \text{div} \vec{b}$   
 (3)  $\text{div}(\vec{a} \times \vec{b}) = \vec{a} \cdot \text{div} \vec{b} - \vec{b} \cdot \text{div} \vec{a}$   
 (4)  $\text{div}(\vec{a} \times \vec{b}) = \vec{b} \cdot \text{curl} \vec{a} - \vec{a} \cdot \text{curl} \vec{b}$

230. The line integral  $\int_C \vec{F} \cdot d\vec{r}$  of a continuous vector function  $\vec{F}$  having continuous first partial derivatives in a simply connected region D, is independent of path C in D if and only if :

- (1)  $\text{div} \vec{F} = 0$  (2)  $\text{div} \vec{F} = 1$   
 (3)  $\text{curl} \vec{F} = 1$  (4)  $\text{curl} \vec{F} = 0$

231. The differential equation of the circle having centre on the x-axis and touches the y-axis at the origin :

- (1)  $2xy \frac{dy}{dx} - x^2 + y^2 = 0$  (2)  $2xy \frac{dy}{dx} + x^2 - y^2 = 0$   
 (3)  $xy \frac{dy}{dx} - 2x^2 + y^2 = 0$  (4)  $2xy \frac{dy}{dx} - x^2 + 2y^2 = 0$

232. Solution of the differential equation :

$$\frac{dy}{dx} + y = e^{-x}, y(x) = 0 \text{ at } x = 0 \text{ is :}$$

- (1)  $y = xe^x$  (2)  $y = x + e^x$   
 (3)  $y = xe^{-x}$  (4)  $y = x - e^x$

233. The particular solution of the differential equation :

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = \sin 2x \text{ is :}$$

- (1)  $\frac{-1}{13} (2 \cos 2x + 3 \sin 2x)$  (2)  $\frac{-1}{13} (\cos 2x + 3 \sin 2x)$   
 (3)  $\frac{1}{13} (2 \cos 2x + 3 \sin 2x)$  (4)  $\frac{-1}{13} (\cos 2x - 3 \sin 2x)$

234. The family of the curve orthogonal to the family of rectangular

hyperbolas  $y = \frac{c}{x}$  (where  $c$  is a parameter) is :

- (1)  $x^2 + y^2 = c$  (2)  $y^2 - x^2 = c$   
 (3)  $x^2 + 2y^2 = c$  (4)  $y^2 - 2x^2 = c$

235. The solution of the differential equation  $\frac{d^2x}{dt^2} - 3\frac{dx}{dt} + 2x = 0$ , given that

when  $t = 0, x = 0$  and  $\frac{dx}{dt} = 1$  is :

- (1)  $x = -e^{2t} + e^t$  (2)  $x = e^{2t} + e^t$   
 (3)  $x = te^t$  (4)  $x = e^{2t} - e^t$

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236. The general solution of the differential equation

$$x \left( \frac{dy}{dx} \right)^2 - 2y \frac{dy}{dx} + ax = 0 \text{ is :}$$

- |                         |                        |
|-------------------------|------------------------|
| (1) $2y = cx^2 + (a/c)$ | (2) $x = cy^3 + (a/c)$ |
| (3) $y = cx^3 + (a/c)$  | (4) $x = cy^2 + (c/a)$ |

237. If the Laplace transform of  $\sin t/t$  is  $\tan^{-1}(1/p)$ , then the Laplace transform of  $\sin at/t$  is :

- |                      |                      |
|----------------------|----------------------|
| (1) $\tan^{-1}(1/p)$ | (2) $\tan^{-1}(a/p)$ |
| (3) $\tan^{-1}(ap)$  | (4) $\cot^{-1}(ap)$  |

238. If  $L\{F(t)\} = f(p)$ , and  $u(t-a)$  is a unit step function for fix  $a \in \mathbb{R}$ , where  $L$  denotes the Laplace transform, then  $L\{F(t-a)u(t-a)\}$  is :

- |                    |                    |
|--------------------|--------------------|
| (1) $e^{ap} f(p)$  | (2) $e^{2p} f(p)$  |
| (3) $e^{-ap} f(p)$ | (4) $e^{-2p} f(p)$ |

239. If  $L^{-1}$  denotes the inverse Laplace transform, then  $L^{-1} \left\{ \frac{1}{(p^2 - 2p + 5)} \right\}$  is

- |                                   |                                  |
|-----------------------------------|----------------------------------|
| (1) $\frac{1}{3} e^{pt} \sin t$   | (2) $\frac{1}{2} e^{t'} \sin 2t$ |
| (3) $-\frac{1}{2} e^{t'} \sin 2t$ | (4) $\frac{1}{2} e^{t'} \sin t$  |

240. If the Laplace transform of  $Y(t)$  is  $y(s)$ , then for initial value problem

$$\frac{d^2Y}{dt^2} + Y = 6 \cos 2t, Y(0) = 3, \frac{dY}{dt} = 1, \text{ when } t = 0, \text{ the value of } y(s) \text{ is :}$$

$$(1) \quad \frac{3s}{s^2+1} - \frac{2s}{s^2+4}$$

$$(2) \quad \frac{3s}{s^2+1} + \frac{1}{s^2+1} - \frac{2s}{s^2+4}$$

$$(3) \quad \frac{5s}{s^2+1} + \frac{1}{s^2+1} - \frac{2s}{s^2+4}$$

$$(4) \quad \frac{5s}{s^2+1} + \frac{1}{s^2+1} - \frac{s}{s^2+4}$$

18P/302/24(i)

**ROUGH WORK**  
रफ़ कार्य

18P/302/24(i)

**ROUGH WORK**  
रफ़ कार्य



## अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली/काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में प्रवेश-पत्र के अतिरिक्त, लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. ओ.एम.आर. उत्तर-पत्र अलग से दिया गया है। इसे न तो मोड़ें और न ही विकृत करें। दूसरा ओ.एम.आर. उत्तर-पत्र नहीं दिया जायेगा। केवल ओ.एम.आर. उत्तर-पत्र का ही मूल्यांकन किया जायेगा।
4. सभी प्रविष्टियाँ प्रथम आवरण-पृष्ठ पर नीली/काली पेन से निर्धारित स्थान पर लिखें।
5. ओ० एम० आर० उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक, केन्द्र कोड नम्बर तथा सेट का नम्बर उचित स्थानों पर लिखें।
6. ओ० एम० आर० उत्तर पत्र पर अनुक्रमांक संख्या, प्रश्नपुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्नपुस्तिका पर अनुक्रमांक और ओ० एम० आर० उत्तर पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिए आपको ओ० एम० आर० उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।
9. प्रत्येक प्रश्न के उत्तर के लिए केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का उत्तर नहीं देना चाहते हैं, तो संबंधित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ कार्य के लिए प्रश्न-पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा उत्तर-पुस्तिका के अंतिम पृष्ठ का प्रयोग करें।
12. परीक्षा की समाप्ति के बाद अभ्यर्थी अपना ओ.एम.आर. उत्तर-पत्र परीक्षा कक्ष/हाल में कक्ष निरीक्षक को सौंप दे। अभ्यर्थी अपने साथ प्रश्न पुस्तिका तथा ओ.एम.आर. उत्तर-पत्र की प्रति ले जा सकते हैं।
13. अभ्यर्थी को परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।