



Direction Q. 13: In the given question, four words have been given, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

13. A) Snake B) Whale C) Crocodile D) Lizard

Direction Q. 14: In the given question, four numbers are given. Out of these, three are alike in a certain way but the rest one is different. Choose the one which is different from the rest three.

14. A) 51 B) 144 C) 64 D) 121

Direction Q. 15: In the given question, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern.

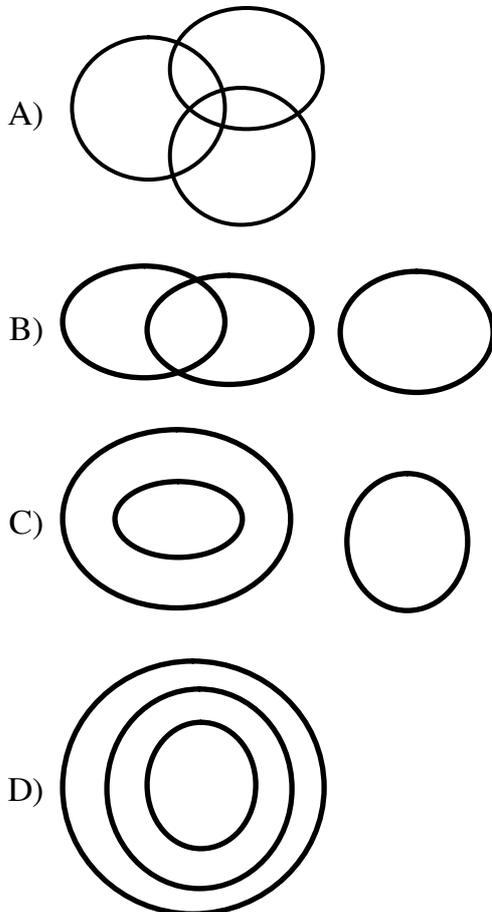
15. 3,9,27,81, (...)

- A) 324 B) 243 C) 210 D) 162

16. If in a certain language, COMPUTER is coded as RFUVQNPC, how is MEDICINE coded in that code ?

- A) EOJDJEFM B) EOLDEJFM C) MFEJDJOE D) MFEDJJOE

17. Which of the following diagrams correctly represents Judge, Thief, Criminal ?





18. A number is doubled and 9 is added. If the resultant is trebled, it becomes 75.
What is that number ?
A) 3.5 B) 6 C) 8 D) none of these
19. 40% of $1640 + ? = 35\%$ of $980 + 150\%$ of 850
A) 372 B) 842 C) 962 D) 1052
20. If $a : b : c = 4 : 1 : 2$ and $(a + b + c) = 14$, then the value of c is
A) 6 B) 7 C) 8 D) 4
21. In what time, will a train 100 meters long cross an electric pole, if its speed be 144 km/hr ?
A) 2.5 seconds B) 4.25 seconds C) 5 seconds D) 12.5 seconds
22. Who has clinched the 2017 women's singles India Super Series Badminton Tournament ?
A) Sung-Ji-Hyuan B) P. V. Sindhu
C) Saina Nehawal D) Carolina Marin
23. Which Institute has topped the 2017 National Institutional Ranking Framework (NIRF) ratings for higher standards institutions ?
A) Indian Institute of Science, Bangalore
B) Indian Institute of Technology, Chennai
C) Indian Institute of Technology, Mumbai
D) Indian Institute of Technology, Kharagpur
24. The National Girl Child Day is observed every year on
A) 26th January
B) 24th January
C) 22nd January
D) 20th January
25. Koteswar Hydro Electric Project is located in
A) Kerala
B) Uttar Pradesh
C) Uttrakhand
D) Rajasthan



26. Concept of Impact Factor was given by
- A) Jorge Hirsch
 - B) Eugene Garfield
 - C) Henry Maxwell
 - D) None
27. Plagiarism is
- A) using the ideas and words of someone else as my own work
 - B) result of a new experiments
 - C) calculation of the H-index
 - D) conducting filed level experiments
28. Which one is not an example of Applied Research ?
- A) curing a specific disease
 - B) improving agricultural crop production
 - C) determination of boiling point of a liquid
 - D) improving the energy efficiency of cars
29. Bibliography is
- A) A list of chemicals used in research
 - B) A list of references cited in a research paper
 - C) Affiliations of the authors in a research paper
 - D) None of the above
30. H-index can be calculated for
- A) an individual researcher
 - B) a university department
 - C) whole university
 - D) all of the above
31. A researcher reproduces a 50 word passage from a cited work but replaces 10 words from the original passage with synonyms. This is an example of
- A) Secondary data
 - B) H-index
 - C) Paraphrasing
 - D) Impact factor
32. Which of the following is not considered to be an example of scientific misconduct ?
- A) Fabrication of data
 - B) Authorship on a project that you did not work
 - C) Plagiarism
 - D) Publishing a table of data with a typographical error



33. Which one of the following tools is used for quantitative research ?
A) Open ended questions
B) Check list
C) Focus depth interviews
D) Observations
34. Which of the following is non-parametric test ?
A) t-test
B) ANOVA
C) Chi-square test
D) All of the above
35. An independent t-test can be used to assess which of the following ?
A) It assesses goodness of fit
B) It assesses relationships between two interval data sets
C) It assesses how many factors there are in questionnaire data
D) All of the above
36. Class of variable which can accept only values from set of integers is classified as
A) Discrete random variable
B) Continuous random variable
C) Posterior random variable
D) All of the above
37. 10^{-12} is called as
A) Mega
B) Terra
C) Pica
D) Giga
38. Chi-square curve ranges from
A) $-\infty$ to $+\infty$
B) 0 to ∞
C) $-\infty$ to 0
D) 0 to 1
39. The straight line graph of the linear equation $Y = a + bX$, slope will be upward if:
A) $b = 0$
B) $b < 0$
C) $b > 0$
D) $b \neq 0$
40. Histogram is a graph of
A) Time series
B) Frequency distribution
C) Qualitative data
D) Ogive
41. A circle in which sectors represents various quantities is called
A) Histogram
B) Frequency Polygon
C) Component Bar chart
D) Pie Chart



42. SPSS is a
- A) Computer hardware used in mouse
 - B) Software package used for data analysis
 - C) Chemical used in experiments
 - D) International organization
43. The correlation coefficient is used to determine
- A) A specific value of the y-variable given a specific value of the x-variable
 - B) A specific value of the x-variable given a specific value of the y-variable
 - C) The strength of the relationship between the x and y variables
 - D) None of these
44. When regression line passes through the origin then
- A) Regression coefficient is zero
 - B) Correlation is zero
 - C) Association is zero
 - D) Intercept is zero
45. In a set of observations, unusual lower and higher values are called as
- A) Outliers
 - B) Central liners
 - C) Median liners
 - D) Free liners
46. The median value for the below given data set :
(13, 18, 13, 14, 13, 16, 14, 21, 13) is
- A) 9
 - B) 13
 - C) 14
 - D) 15
47. The probability of an event cannot be
- A) 0.3
 - B) 0.5
 - C) - 0.5
 - D) 1.0
48. Normal distribution is
- A) Platykurtic
 - B) Mesokurtic
 - C) Leptocurtic
 - D) All of the above
49. Which of the following is an example of a secondary source of information ?
- A) Experiment
 - B) Survey
 - C) Journal
 - D) Questionnaire
50. Hypothesis tests are designed so that the _____ hypothesis will be rejected.
- A) null
 - B) alternative
 - C) alpha
 - D) beta



PART – B

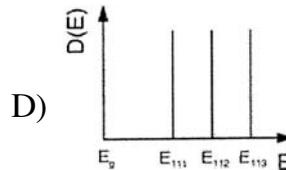
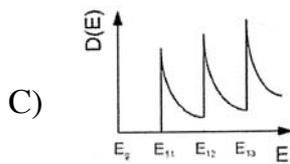
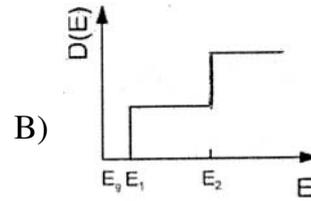
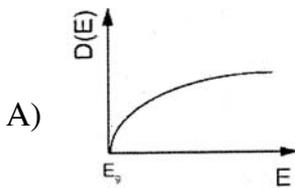
51. 100 Graphene layers stacked together will form
A) Graphane
B) Carbon Nano tube
C) Graphite
D) Amorphous carbon
52. Nanoindentation is NOT used to determine
A) Hardness
B) Modulus
C) Fracture toughness
D) Bond -length
53. Quantum confinement will make silicon
A) a pseudo-direct band-gap material
B) an indirect band gap material
C) a superconductive material
D) an insulator
54. A decrease in yield strength with decrease in grain size after 5nm is called
A) Hall-Petch effect
B) Inverse Hall-Petch effect
C) Hooks Law
D) None of these
55. X-ray diffraction of a nano crystalline material may give
A) a sharp peak
B) a wide peak
C) two sharp peaks
D) more than one sharp peak
56. On making the voltage twice the original value, the wavelength of electron λ will change to
A) $\frac{\lambda}{\sqrt{2}}$
B) $\frac{\lambda}{2}$
C) $\lambda\sqrt{2}$
D) 2λ
57. The process of making Graphene by repeated peeling with an adhesive tape on a graphite crystal is called
A) Mechanical exfoliation
B) Sol gel techniques
C) Chemical Vapour deposition
D) Mechanical attrition
58. The number of equivalent sub lattices in graphene is
A) 1
B) 2
C) 3
D) 0
59. Which of the following is NOT associated with thin film deposition ?
A) Physisorption
B) Chemisorption
C) Sticking coefficient
D) Moment of inertia
60. Sputtering is a method to
A) Deposit thin films
B) Perform mechanical tests
C) Perform optical tests
D) Obtain magnetization and magnetic field plot



61. SQUID stands for
A) Superconducting Quantum Interference Device
B) Semiconducting Quantum Interference Device
C) Strain Quantum Interference Device
D) Superparamagnetic Quantum Interference Device
62. In order to be Raman active, a molecular rotation or vibration must cause some change in
A) Molecular polarizability
B) Elemental composition
C) Charge
D) All of these
63. The nature of stress-strain plot of copper before elastic limit is
A) Linear
B) Parabolic
C) Gaussian
D) Lorentzian
64. A half plane of atoms in a crystal is called
A) Point defect
B) Frenkel defect
C) Schottky defect
D) Dislocation
65. Due to chromatic aberration, the image will appear
A) coloured
B) sharpened
C) no image
D) all of these
66. For primitive lattice vector a , the range of first Brillouin zone is
A) $+\frac{\pi}{a}$ to $-\frac{\pi}{a}$
B) $+\frac{\pi}{a}$ to $-\frac{a}{\pi}$
C) $+\frac{\pi}{a}$ to $\frac{2\pi}{a}$
D) $+\frac{2\pi}{a}$ to $\frac{\pi}{a}$
67. For a three dimensional body, Strain is a
A) vector
B) tensor
C) scalar
D) none of these
68. When periodicity of atoms is interrupted by grain boundaries, the material is
A) single crystalline
B) polycrystalline
C) amorphous
D) none of these
69. High mobility of valence electrons in metals causes
A) High electrical conductivity and high thermal conductivity
B) High electrical conductivity and low thermal conductivity
C) Low electrical conductivity and high thermal conductivity
D) Low electrical conductivity and low thermal conductivity
70. If density of free electron is equal to the density of free holes, the semiconductor is
A) intrinsic
B) extrinsic
C) compound
D) all of these



71. The unit of Hardness and Modulus are
A) GPa and GPa respectively
B) GPa and Newton / Meter respectively
C) Newton / Meter and GPa respectively
D) Newton – meter and Newton / Meter respectively
72. The total number of atoms associated with one HCP crystal unit is
A) 2 B) 4 C) 6 D) 8
73. For a quantum dot the density of state $D(E)$ will vary with energy as



74. We can obtain reciprocal lattice of a real lattice in
A) Diffraction pattern B) Optical image
C) Atomic Force microscopy D) All of these
75. If $\psi(x, t)$ is a wave function of a particle, then $|\psi(x, t)|^2$ will represent the
A) Probability B) De-Broglie wavelength
C) Group velocity D) Phase velocity
76. The D and G peaks usually obtained in the Raman Spectra of Carbon materials are
A) Disorder and Graphitic peaks B) Distorted and Ground peaks
C) Deca and Giga peaks D) Dimensional and Graphitic peaks
77. Fick's law is related to
A) Diffusion B) Diffraction
C) Super paramagnetism D) Optical efficiency
78. The material alumina (Al_2O_3) can be used in
A) electrical insulation B) electrical conduction
C) making ferromagnetic D) all of these



79. During epitaxial thin film deposition, a strong cohesive energy between the depositing atoms will lead to
- A) island type deposition B) layer by layer deposition
C) layer and island deposition D) no deposition
80. MATLAB is a
- A) Computational software B) Mechanical testing equipment
C) Electrical testing equipment D) Chemical structure analysis tool
81. Titanium dioxide is known for
- A) High hardness B) Photo activity
C) Ferromagnetism D) All of these
82. What will be the outcome of the following program ?
- ```

R = 1
10 S = 2R + 1
If S = 9
 Write R
 Else R = R + 1
10
END

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- A) 1                      B) 2                      C) 3                      D) 4
83. The eigen values of the following matrix  $\begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$  is
- A) 2 and 3                      B) only 2                      C) only 3                      D) 0
84. Light is an
- A) Electromagnetic wave                      B) Mechanical wave  
C) Only electrical wave                        D) Not a wave at all
85. The motion of atomic nuclei and electrons in a molecule can be separated is known as
- A) Born Oppenheimer approximation        B) Drude model  
C) Surface Plasmon resonance                D) Moseley's Law
86. If A and B are cations of different size and O is present at the face center, then a Perovskite material can be represented as
- A)  $ABO_3$                       B)  $ABO_2$                       C)  $AB_3O_3$                       D)  $AB_3O$
87. Raman effect is due to collision of
- A) Photon with electron                        B) Photon with molecule  
C) Electron with atom                            D) Electron with photon





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**SPACE FOR ROUGH WORK**