

Question Booklet Series:

**D****Polytechnic Entrance Test – 2019****QUESTION BOOKLET**

Question Booklet Number:

**850286****INSTRUCTIONS**Maximum Time Allowed: 8 Hours  
Negative Marking: 0.25 MarksNo. of Questions: 180  
Maximum Marks: 180

Roll Number:

Answer Sheet Number:

Please read the following instructions carefully: 1) Check the

**Booklet:** In case of any defect (Misprint, Missing question(s), Missing page, Blank page, page, Damaged or Defaced page or duplication of question(s) / Page(s)), get the Booklet changed with the Booklet of the same series from the Room Invigilator. No complaint shall be entertained after the Entrance Test is over.

2) Write your Roll Number and the OMR Answer Sheet Number on the Question Booklet.

3) Mark carefully your Roll Number, Question Booklet Number, Paper Code, Question Booklet Series and Course on the OMR Answer Sheet and sign at the appropriate place. Candidates shall be personally responsible for any mistake committed in making these entries in the OMR Answer Sheet. Board shall under no circumstances be responsible for any such mistake.

4) Strictly follow the instructions given by the Centre Supervisor / Room Invigilator and those given on the Question Booklet.

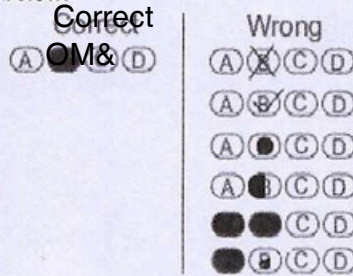
5) Candidates are not allowed to carry any papers, notes, books, calculators, cellular phones, scanning devices, pagers, etc. to the Examination Hall. Any candidate found using, or in possession of such unauthorized material or indulging in copying or impersonation or adopting unfair means (reporting late / without Admit Card will be debarred from the Entrance Test).

6) Please mark the right responses on the OMR Sheet with ONLY a Blue/Black ball point pen. Use of eraser, whitener (fluid) and cutting on the OMR Answer Sheet is NOT allowed. The test is of objective type, containing multiple choice questions (MCQs). Each objective question is followed by four responses. You are required to choose the correct/best response and mark your response on the OMR Answer Sheet and NOT on the Question Booklet.

7) There will be negative marking of 0.25 marks for every wrong answer.

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9) For marking response to a question, completely darken the CIRCLE so that the alphabet inside the CIRCLE is not visible. Darken only ONE circle for each question. If you darken more than one circle, it will be treated as a wrong answer. The CORRECT and the WRONG method of darkening the CIRCLE on the OMR Answer Sheet are shown below.



10) Please be careful while marking the response to questions. The response once marked cannot be changed and if done shall be treated as a wrong answer.

11) In view of the limited time, do NOT waste your time on a question which you find difficult.

12) DO NOT make any stray or faint mark anywhere in or around the OMR Answer Sheet. Do NOT read or write on the OMR Answer Sheet. DO NOT fold or wrinkle the OMR Answer Sheet.

13) Rough work MUST NOT be done on the OMR Answer Sheet. Use rough page of your Question Booklet for this purpose.

14) Candidates are provided carbonless OMR Answer Sheet, having original copy and candidate's copy. After completing the examination, candidates are directed to fold at perforation on the OMR Answer Sheet to retain separate original copy and candidate's copy, and then hand over the original copy of OMR Answer Sheet to the Room Invigilator and retain candidate's copy with them.

**DO NOT OPEN THE SEAL OF THIS BOOKLET UNTIL TQOTO 0050**

## Section 1 — English

1) Fill in the blank with the correct option:

Each of them a pen .

- A) was
- B) has
- C) have
- D) is

2) Fill in the blank with the correct option:

I ask a question?

- A) Might be
- B) Might have
- C) May
- D) Could have

3) Fill in the blank with the correct option:

The girl was from New Delhi.

- A) Which scooty we purchased
- B) Whose scooty we purchased
- C) That scooty we purchased
- D) What scooty we purchased

4) Choose the correct verb form and fill the blank:

Only in the evening, my father reminded me to finish my assignment but I it earlier.

- A) have finished
- B) had finished
- C) am finishing
- D) should finish

5) She is ill today.

Which of these is a Negative of this sentence?

- A) She may be sick today.
- B) She is not ill today.
- C) She need not be ill today.
- D) She will not be ill today.

6) Fill in the blank with proper pronoun.

I Will do it

- A) thyself
- B) myself
- C) yourself
- D) himself

7) Choose the correct option to complete the sentence: His father was very strict; he had no choice but (obey).

- A) to obey
- B) obeying
- C) be obeying
- D) to obeying

8) Fill in the blank with the correct option:  
you speak Russian?

- A) Could have been
- B) Could have
- C) Can be
- D) Can

9) Choose the correct verb form and fill the blank:

The students their assignments before the teacher asked them to.

- A) was submitting
- B) are submitting
- C) had submitted
- D) may submit

10) Turn the following sentence into indirect speech.

The little girl said, 'My mother teaches me French at home.'

- A) The little girl said that her mother taught her French at home
- B) My mother was teaching me French when I am at home the little girl said.
- C) I was taught French while I was at home by my mother.
- D) Teaching of French when I was at home was done by my mother.

11) Fill in the blank with correct option:

Has the HR manager signed the latest sales proposal provided us last month?

- A) What the finance expert
- B) Which the finance expert
- C) That the finance expert
- D) Who the finance expert



12) Fill in the blank with a suitable conjunction:

Rohit Sam are the best of friends.

- A) or
- B) but
- C) and
- D) also

13) Fill in the blank with a suitable conjunction:

The offer was tempting that I could not refuse it.

- A) also
- B) as
- C) so
- D) both

14) Complete the sentence using the correct Infinitive of the verb given in brackets.

As the deadline is tomorrow, there is no time (waste)

- A) for wasting
- B) to waste
- C) to wasting
- D) to be wasting

15) Use proper Interrogative pronoun.

Your Father, does he do?

- A) who
- B) what
- C) whose
- D) whom

16) Fill in the blank with the correct option:

Can you see the old lady

- A) Which is sitting near that old tree?
- B) Whose is sitting near that old tree?
- C) Who is sitting near that old tree?
- D) Whom is sitting near that old tree?

17) Name the type of sentence:

How is this possible?

- A) Interrogative sentence
- B) Negative sentence
- C) Exclamatory sentence
- D) Imperative sentence

18) Fill in the blank with the correct option:

He is taller than

- A) me
- B) she
- C) I
- D) he

19) Choose the correct option to join the two sentences:

Take your cardigan with you you are not cold later in the evening.

- A) so that
- B) as soon as
- C) as if
- D) not only

20) Name the type of sentence:

We sat down.

- A) Assertive sentence
- B) Interrogative sentence
- C) Exclamatory sentence
- D) Imperative sentence

21) Fill in the blank with the appropriate option:

The rich help the poor.

- A) Should
- B) Be
- C) Is
- D) Ought

22) Which of the following is a Declarative sentence.

- A) The sun rises in the east.
- B) Please let me work.
- C) How hot it is!
- D) Have you done your home -work?

23) Identify the Imperative sentence.

- A) Will you have a little more Tea?
- B) Have you done your work?
- C) The boys made a noise.
- D) Please convey my heartfelt condolences to your parents.

24) Fill in the blank with the correct option:  
Why she take care of his issues?

- A) Can be
- B) Should
- C) Could have
- D) Should have

25) Choose the correct verb form and fill the blank:  
I had taken a tablet before I my dinner.

- A) ate
- B) was eating
- C) will eat
- D) had eaten

26) Choose the correct option to join the two sentences:  
I suspect she will forget the appointment  
reminded her twice.

- A) so that
- B) even though
- C) in spite of
- D) as if

27) Turn the following sentence into indirect speech.  
The driver asked the policeman, "Will I be fined if I take a right turn?"

- A) The driver asked the policeman if he would be fined if he took a right turn there.
- B) The driver asked the police man if he will fine him if he takes a right turn.
- C) The policeman was asked by the driver if he will fine him if he takes a right turn there.
- D) By taking a right turn here will I incur a fine the driver asked the policeman.

28) Turn the following sentence into indirect speech.  
My professor said to me, 'you will have a bright future in the US.'

- A) My future in the US will be bright is what my professor was telling to me
- B) My professor told me that I would have a bright future in the US.
- C) I was being told by my professor that my future will be bright in the US
- D) I will have a bright future in the US my professor was telling me

29) Name the type of sentence:  
Being tired, he sat down.

- A) Simple sentence
- B) Compound sentence
- C) Complex sentence
- D) Exclamatory sentence

30) Choose the correct answer:  
They were relieved the traffic flowing more easily.

- A) find
- B) to find
- C) finding
- D) found

## Section 2 — Physics

31) A white colour when passes through a prism it undergoes dispersion. The colour in the emergent beam for which the angle of deviation is maximum is

- A) violet
- B) red
- C) yellow
- D) blue

32) The voltage across a resistor which has a resistance of  $44\ \Omega$  and carrying a current of  $5\text{ A}$  is

- A)  $8.8\text{ V}$
- B)  $44\text{ V}$
- C)  $152\text{ V}$
- D)  $220\text{ V}$

33) The optical phenomenon which is used in animation is

- A) Persistence of vision
- B) Power of accommodation
- C) Short sightedness
- D) Internal reflection

34) Two small magnet each of magnetic moment  $10\text{ Am}^2$  are placed end to end on position  $0.1\text{ m}$  apart from their centers. The force acting between them is

- A)  $0.6 \times 10^{-7}\text{ N}$
- B)  $0.6 \times 10^7\text{ N}$
- C)  $0.6\text{ N}$
- D)  $0.6 \times 10^5\text{ N}$

35) The coercivity of a permanent magnet is  $4 \times 10^4\text{ Am}^{-1}$ . A magnet is placed inside a solenoid of length  $15\text{ cm}$  long having  $600$  turns. A current is passed through the solenoid to demagnetize it complete. The required current is

- A)  $20\text{ A}$
- B)  $1\text{ A}$
- C)  $10\text{ A}$
- D)  $100\text{ A}$

36) The total resistance of a circuit consisting of three resistors connected in series is  $15\ \Omega$  and two of the resistors have a resistance of  $2\ \Omega$  each. The resistance of the third resistor is

- A)  $3500\ \Omega$
- B)  $7500\ \Omega$
- C)  $9000\ \Omega$
- D)  $11000\ \Omega$

37) The deflection in a moving coil galvanometer falls from  $50$  divisions to  $10$  divisions when a shunt of  $12\ \Omega$  is applied. The resistance of the galvanometer is

- A)  $120$
- B)  $2452$
- C)  $360$
- D)  $480$

38) The power of a plane glass plate is

- A) infinite
- B) zero
- C) one
- D) greater than one

39) The part of the human eye which consists of light and colour sensitive cells is

- A) Retina
- B) Cornea
- C) Pupil
- D) Lens

40) The process involved in the energy production in a nuclear reactor is

- A) Nuclear fission
- B) Nuclear fusion
- C) Combustion reaction
- D) Double displacement

41) The commercial unit of electrical energy is

- A) Kilowatt hour
- B) Watt hour
- C) Watt
- D) Kilowatt

42) The branch of physics that deals with the measurement of light energy in terms of the perceived brightness of human eye is

- A) radiometry
- B) photometry
- C) optics
- D) spectrometry

43) Due to high pressure and temperature, the plants that got buried under swamps inside the earth gets converted into

- A) wood
- B) oil
- C) hydel energy
- D) coal

44) If a convex lens of focal length 'f' is cut into two parts along a plane passing through the principal axis, then the focal length of each part is

- A) f
- B) f/2
- C) 2f
- D) f/4

45) The most commonly used conductor in electric circuits is

- A) Gold
- B) Silver
- C) Aluminium
- D) Copper

46) If 'R' is the resistance, 'L' the length and 'A' the area of cross-section of the conductor, then resistivity 'p' is defined by the equation

- A)  $p = RAL$
- B)  $p = RA/L$
- C)  $p = R/AL$
- D)  $p = A/LR$

47) A lens which diverges a beam of light and which is thinner at the centre as compared to its edges is

- A) Concave lens
- B) Convex lens
- C) Plano-convex lens
- D) Plano-concave lens

48) The part of the human eye which acts like aperture of a camera and thus regulates the amount of light entering the eyes is

- A) Sclera
- B) Lens
- C) Pupil
- D) Retina

49) The equivalent resistance of a circuit consisting of three resistors 120  $\Omega$ , 150  $\Omega$  and 220  $\Omega$  connected in series connection is

- A) 350  $\Omega$
- B) 375
- C) 490  $\Omega$
- D) 575  $\Omega$

50) The work done in moving 6 C of charge between two points having potential difference of 20 V is

- A) 3 J
- B) 60 J
- C) 120 J
- D) 210 J

51) In India, the frequency of power supply is

- A) 50 Hz
- B) 20 Hz
- C) 60 Hz
- D) 70 Hz

52) A convex lens of focal length 20 cm has an object placed at a certain distance and it produces a real image whose magnification is 4 times. The object distance is

- A) (-0.05 m)
- B) (0.15 m)
- C) (- 0.25 m)
- D) (-0.50 m)

53) An alpha particle (positive charge particle) enter a magnetic field at right angle. In which direction does the force act on the alpha particle?

- A) Circular
- B) Upward
- C) Parallel
- D) Horizontal

54) A Magnetizing field of  $1600 \text{ Am}^{-1}$  produces a magnetic flux of  $2.4 \times 10^{-5} \text{ wb}$  in an iron bar of cross-sectional area  $0.2 \text{ cm}^2$ . The susceptibility of the bar is

- A) 298
- B) 596
- C) 1192
- D) 1788

55) The power of a microscope with angular magnification 10 and near vision 25 cm is

- A) 0.4 D
- B) 4D
- C) 40 D
- D) 0.04 D

56) The energy given to each coulomb of charge for by the retina and it connects the eye to brain is passing through a 12 V battery is

- A)  $1.6 \times 10^{-19} \text{ J}$
- B) 21 J
- C) 12J
- D)  $6.1 \times 10^{-19} \text{ J}$

57) For any medium, the value of absolute refractive index is always

- A) less than one
- B) equal to one
- C) greater than one
- D) zero

58) From the harnessing and utilization point, the energy which will lead to least environment pollution is

- A) Nuclear energy
- B) Thermal energy
- C) Solar energy
- ID) Geothermal energy

59) The magnetic field inside a long straight solenoid is

- A) Zero
- B) Variable
- C) Same at all points
- D) Non uniform

60) Energy consumed by an appliance that draws 2 A from a 6 V battery for 3 hours is

- A) 12 Wh
- B) 63 Wh
- C) 36 Wh
- D) 2160 Wh

61) A device which is usually connected in parallel and measure the potential difference is

- A) Voltmeter
- B) Ammeter
- C) Galvanometer
- D) Ohmmeter

62) The nerve layer which carries the impulses formed by the retina and it connects the eye to brain is

- A) Viterous humour
- B) Optic nerve
- C) Cornea
- D) Blind spot

63) What is the approximate number of electrons passed through a lamp in 2 minutes if the current through it is 200 mA?

- A)  $12 \times 10^{18}$
- B)  $24 \times 10^{18}$
- C)  $48 \times 10^{18}$
- D)  $150 \times 10^{18}$

64) The source of energy which can produce both power and manure is

- A) Hydroelectric plants
- B) Nuclear plants
- C) Biogas plants
- D) Thermal plants

65) An alternating current has a frequency of 50 Hz. How many times will it change its direction in one second?

- A) 100 times
- B) 200 times
- C) 10 times
- D) 150 times

- 66) If the focal length of a convex lens is 25 cm, then the power of the lens would be
- A) (4D)  
B) (-4D)  
C) (0.4D)  
D) (-0.4D)
- 67) The most common material used in nuclear reactors for shielding from radiations is
- A) Thin galvanised sheets  
B) Lead or concrete  
C) Carbon papers  
D) Graphite
- 68) Which among the given medium has highest refractive index?
- A) Diamond  
B) Water  
C) Glass  
D) Immersion oil
- 69) The mirror which is used in anti-shoplifting devices is
- A) convex mirror  
B) planoconcave mirror  
C) concave mirror  
D) plane mirror
- 70) A circuit consists of resistors with resistances 3  $\Omega$  and 5  $\Omega$  connected in parallel and a current of 15 A divides between the branches of these resistors. The current through each resistor is
- A) 4.9 A, 6.5 A  
B) 9.4 A, 5.6 A  
C) 9.4 A, 6.5 A  
D) 4.9 A, 5.6 A
- 71) The potential difference of battery when 50 J of work is done in moving a charge of 5 C from one terminal of the battery to the other is
- A) 10 V  
B) 20 V  
C) 250 V  
D) 200 V
- 72) A circuit has a fuse of 5A. How many number of lamps of 100 Watt, 220 Volt can be used in the circuit?
- A) 11  
B) 20  
C) 5  
D) 15
- 73) The relative permeability of a medium is 0.075. The magnetic susceptibility of that medium will be
- A) 0.925  
B) -0.925  
C) 1.075  
D) -1.075
- 74) Resistivity of a given material usually depends on the
- A) length of the material  
B) nature of the material  
C) shape of the material  
D) thickness of the material
- 75) A circuit consists of three resistors connected in series. If the circuit is reconnected by removing one of the resistors from the circuit, then the flow of current through the circuit
- A) increases  
B) remains constant  
C) decreases  
D) decreases by half
- 76) The angular dispersion produced by a prism of angle  $4^\circ$  and refractive index of 1.65 & 1.55 for violet and red colour respectively, is
- A)  $0.4^\circ$   
B)  $0.04^\circ$   
C)  $4^\circ$   
D)  $40^\circ$
- 77) The volatile liquid which is boiled using the heat from the hot water at the surface of the ocean to run the turbines for generating ocean thermal energy is
- A) Acetone  
B) Ammonia  
C) Ethanol  
D) Alcohol



78) The part of the solar cooker which is responsible for green house effect is

- A) Mirror
- B) Glass sheet
- C) Black colour coating
- D) Outer cover of solar cooker

79) Charcoal is considered as a better fuel than wood because, charcoal

- A) produces lot of smoke
- B) has higher calorific value
- C) has low calorific value
- D) is not convenient to use

80) The defect which arises due to the decrease in the focal length of the crystalline lens or elongation of the eye ball can be corrected by using

- A) Convex lens
- B) Concave lens
- C) Concavo-convex lens
- D) Bi-focal lens

## Section 3 — Chemistry

81) A metal 'X' obtained in the form of ribbon is burned in air to get a white solid 'Y' which is soluble in water to give a basic solution. The solution becomes basic due to the formation of

- A)  $\text{Zn(OH)}_2$
- B)  $\text{Mg(OH)}_2$
- C)  $\text{Ca(OH)}_2$
- D)  $\text{Al(OH)}_3$

82)  $\text{C}_2\text{H}_4 + \text{H}_2\text{SO}_4 \xrightarrow{80^\circ\text{C}} \text{H}_2\text{O} / \text{A}$  heat  
Identify "A" and "B" products in the reaction? >B

- A)  $\text{C}_2\text{H}_5\text{I}$ ,  $\text{C}_2\text{H}_5\text{OH}$
- B)  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_5\text{OH}$
- C)  $\text{C}_2\text{H}_5\text{OSO}_3\text{H}$ ,  $\text{CH}_3\text{OH}$
- D)  $\text{C}_2\text{H}_5\text{OSO}_3\text{H}$ ,  $\text{C}_2\text{H}_5\text{OH}$

83) Which of the following compound is known as vitamin B5?

- A) Lactic acid
- B) Formic acid
- C) Ascorbic acid
- D) Pantothenic acid

84) How many different structural isomers having the molecular formula  $\text{C}_5\text{H}_{12}$  are there?

- A) 2
- B) 3
- C) 4
- D) 5

85) Which of the following is used to detect nitrogen and sulphur in organic compounds?

- A) Carius test
- B) Fehling's test
- C) Tollen's test
- D) Lassaigne's test

86) What is the property called where there is tendency of self combination of carbon?

- A) Isomerism
- B) Catenation
- C) Tetravalency
- D) Electromeric effect

87) The correct order of first ionization potentials of Na, Mg, Al and Si are

- A)  $\text{Na} < \text{Mg} > \text{Al} < \text{Si}$
- B)  $\text{Na} < \text{Mg} < \text{Al} > \text{Si}$
- C)  $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$
- D)  $\text{Na} > \text{Mg} > \text{Al} < \text{Si}$

88) Which statement is INCORRECT with respect to phenols?

- A) Phenol can be prepared from diazonium salts
- B) The hydroxyl group in phenol acts as electron withdrawing group
- C) Phenols are weaker acids than alcohols and water
- D) Phenol molecule is less stable when compared to phenoxide ion

89) Among the following compounds, which molecule is an "Achiral" molecule?

- A) 2-Bromopropane
- B) Pentan-2-ol
- C) 2-Bromobutane
- D) 2-Chloropropanal

90) During respiration, the combustion of sugar produces

- A) carbon dioxide and hydrogen
- B) carbon dioxide and water
- C) carbon dioxide and methane
- D) ethane and water

91) The number of elements present in 5th period

- A) 8
- B) 18
- C) 19
- D) 32

92) Which of the following statements is INCORRECT with regards to properties of a base?

- A) It can accept proton
- B) It can donate electron pair
- C) It turns blue litmus red
- D) Gives  $\text{OH}^-$  ions in solution

93) When a metal reacts with hydrochloric acid which of the following products are formed?

- A) Metal hydride and chlorine gas
- B) Metal salt and hydrogen gas
- C) No chemical reactions take place
- D) Metal containing weak acid and hydrogen gas

94) Aqua regia is the mixture of

- A)  $\text{H}_2\text{SO}_4 + \text{HCl}$  (3:1)
- B)  $\text{H}_2\text{SO}_4 + \text{HCl}$  (1:3)
- C)  $\text{HNO}_3 + \text{HCl}$  (3:1)
- D)  $\text{HNO}_3 + \text{HCl}$  (1:3)

95) Hoopes process is used for the refining of

- A) Al
- B) Cs
- C) Ag
- D) Au

96) Which of the following group of elements forms a Dobernier triad?

- A) Chlorine, bromine and iodine
- B) Platinum, neon and fluorine
- C) Hydrogen, oxygen and nitrogen
- D) Titanium, zirconium and palladium

97) The correct order of following metals in the decreasing order of their reactivity with HCl

- A)  $\text{Fe} > \text{Zn} > \text{Al} > \text{Mg}$
- B)  $\text{Fe} > \text{Al} > \text{Zn} > \text{Mg}$
- C)  $\text{Mg} > \text{Al} > \text{Zn} > \text{Fe}$
- D)  $\text{Mg} > \text{Zn} > \text{Al} > \text{Fe}$

98) When iron nails are added into copper sulphate solution, the iron nails become brownish in colour and the blue colour of the copper sulphate solution becomes faded. The balanced chemical equation for this reaction is

- A)  $\text{Fe} + \text{Cu}_2\text{SO}_4 \rightarrow \text{FeSO}_4 + 2\text{Cu}$
- B)  $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$
- C)  $2\text{Fe} + \text{CuSO}_4 \rightarrow \text{Fe}_2\text{SO}_4 + \text{Cu}$
- D)  $\text{Fe} + \text{Cu}_3\text{SO}_4 \rightarrow \text{FeSO}_4 + 3\text{Cu}$

99)  $\text{C}_6\text{H}_5\text{COOH}$  is a weaker acid than  $\text{H}_2\text{SO}_4$  because

- A) it is less corrosive than  $\text{H}_2\text{SO}_4$
- B) it ionizes partially in aqueous solution
- C) it has less thermal stability
- D) it ionizes completely in aqueous solution

100) Which of the following pairs of elements are metalloids?

- A) Sodium and Potassium
- B) Fluorine and Bromine
- C) Radium and Germanium
- D) Arsenic and Silicon

101) Lucas Reagent is used to classify alcohols of low molecular weight. What is Lucas Reagent?

- A) Concentrated  $\text{HCl} + \text{ZnCl}_2$
- B) Concentrated  $\text{H}_2\text{SO}_4 + \text{ZnSO}_4$
- C) Concentrated  $\text{HNO}_3 + \text{ZnSO}_4$
- D) Concentrated  $\text{HNO}_3 + \text{ZnCl}_2$

102) What are the products obtained when ethyl phenyl ether reacts with excess HI?

- A) Ethyl iodide and iodobenzene
- B) Ethyl alcohol and phenol
- C) Ethyl iodide and phenol
- D) Ethyl alcohol and iodobenzene

103) What is the IUPAC name of Phenyl isopentyl ether?

- A) 3-methyl phenoxy butane
- B) 3-methyl butoxy benzene
- C) 2-methyl butoxy-6-benzene
- D) 2-methyl phenoxy butane

104) Which catalyst is used for reduction of alkyne into Cis-Alkene?

- A) Palladised Charcoal
- B) Sodium in liquid Ammonia
- C) Alcoholic KOH
- D) Aqueous KOH

105) When a copper plate is dipped in silver nitrate solution, a black layer is observed on the surface of copper plate. The reaction responsible for this phenomenon is

- A)  $2\text{AgNO}_3 + \text{Cu} \longrightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 4\text{Ag}(\text{s})$
- B)  $\text{AgNO}_3 + \text{Cu}(\text{s}) \rightarrow \text{CuNO}_3(\text{aq}) + \text{Ag}(\text{s})$
- C)  $\text{Ag}_2\text{NO}_3 + \text{Cu} \rightarrow \text{CuNO}_3(\text{aq}) + 2\text{Ag}(\text{s})$
- D)  $2\text{AgNO}_3(\text{aq}) + \text{Cu} \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$

106) Which of the following species are produced as a product of neutralization reactions?

- A)  $\text{H}^+$  and acid
- B)  $\text{OH}^-$  and base
- C)  $\text{H}_2\text{O}$  and salt
- D)  $\text{H}_3\text{O}^+$  and alcohol

107) Cryolite is an uncommon mineral of very limited natural distribution. Chemically, cryolite is

- A) Sodium fluoride
- B) Aluminium fluoride
- C) Sodium aluminium fluoride
- D) Calcium fluoride

108) A brown substance 'X' on heating in air forms a substance 'Y'. When hydrogen gas is passed over heated 'Y' it again changes back to 'X'. Substance 'Y' is

- A)  $\text{MgO}$
- B)  $\text{CuO}$
- C)  $\text{FeO}$
- D)  $\text{ZnO}$

109) Flash bulbs produce a short-duration high-intensity light flash for taking photographs. In flash bulbs, Mg wire is present in an atmosphere of

- A)  $\text{N}_2$
- B) He
- C)  $\text{SO}_2$
- D)  $\text{O}_2$

110) The element with atomic number 36 belongs to which of the following groups?

- A) Alkali metals
- B) Alkali earth metals
- C) Halogens
- D) Noble gases

## Section 4 - Mathematics

111) Which of the following is TRUE for the value of 'p' for which the equation  $px^2 + 4x + 1 = 0$  has only real roots?

- A)  $p = 4$
- B)  $p \geq 7$
- C)  $p \geq 4$
- D)  $p > 8$

112) A cone of height 10 cm with diameter of its base 20 cm is carved out from a wooden solid sphere of radius 10 cm. What is the percentage of the wood consumed in the cone?

- A) 25%
- B) 50%
- C) 75%
- D) 20%

113) If  $0 < A < \pi/2$ , then  $(1 + \tan^2 A) / (1 + \cot^2 A) =$

- A)  $\sec^2 A$
- B)  $\operatorname{cosec}^2 A$
- C)  $\cot A$
- D)  $\tan^2 A$

114) If  $\tan 2A = \cot(A - 18^\circ)$ , where  $2A$  is acute angle, then

- A)  $A = 35^\circ$
- B)  $A = 30^\circ$
- C)  $A = 36^\circ$
- D)  $A = 42^\circ$

115) If  $0 < \theta < \pi/2$ , then  $(1 + \tan \theta + \sec \theta)(1 + \cot \theta - \operatorname{cosec} \theta) =$

- A) 0
- B) 1
- C) 2
- D) -1

116) What is the value of 'k' for which  $x = 1$  is a root of the equation  $x^2 + kx + 3 = 0$ ?

- A)  $k = 4$
- B)  $k = 2$
- C)  $k = -4$
- D)  $k = 1$

117) Which term in the arithmetic progression -7, -2, 3, 8, .... is 88?

- A) 15th
- B) 10th
- C) 20th
- D) 21st

118) What is the volume of the largest possible right circular cone that can be cut out of a cube of edge length 42 cm?

- A) 924 cu. cm
- B) 22997 cu. cm
- C) 882 cu. cm
- D) 19404 cu. cm

119) If in  $\triangle PQR$  which is right angled at Q,  $PR + QR = 25$  cm and  $PQ = 5$  cm, then  $\sin P =$

- A)  $12/13$
- B)  $1/3$
- C)  $2/13$
- D)  $5/12$

120) If both the diameter and height of a right circular cone are increased by 40%, then its volume is increased by

- A) 274.40%
- B) 174.40%
- C) 150.50%
- D) 125%

121) What is the area of the triangle whose vertices are (1, -1), (-4, 6) and (-3, -5)?

- A) 12 square units
- B) 13 square units
- C) 24 square units
- D) 15 square units

122) The interior angles of a quadrilateral are in arithmetic progression with a common difference of  $10^\circ$ . The angles are

- A)  $55^\circ, 65^\circ, 75^\circ, 85^\circ$
- B)  $90^\circ, 100^\circ, 110^\circ, 120^\circ$
- C)  $60^\circ, 70^\circ, 80^\circ, 90^\circ$
- D)  $75^\circ, 85^\circ, 95^\circ, 105^\circ$

123) In the figure below  $XY \parallel BC$ ,  $AY = (p-2)$  units,  $BY = (2p-2)$  units and  $AX / CX = 1/3$ . Which of the following is the correct value of  $p$ ?

$p-2$  Y  $2p-2$

- A) 5
- B) 2
- C) 3
- D) 4

124) Which one of the following statements is TRUE?

- A) Every natural number is an integer
- B) Every rational number is a natural number
- C) Every irrational number is a natural number
- D) Every rational number is an integer

125) If the two zeroes of the quadratic polynomial  $f(x) = x^2 - 6kx - 9$  are numerically equal but opposite in sign, then what is the value of 'k'?

- A) 1
- B) 0
- C) -1
- D) 2

126)  $\triangle ABC$  is similar to  $\triangle XYZ$ . If the area of  $\triangle ABC$  is 4 times the area of  $\triangle XYZ$  and  $XY = 5$  units, then what is the length of  $AB$  which is corresponding side to  $XY$ ?

- A) 20 units
- B) 10 units
- C) 100 units
- D) 1.25 units

127) The total surface area of a solid hemisphere of diameter 42 cm is

- A) 1202 sq. cm
- B) 4158 sq. cm
- C) 1376 sq. cm
- D) 6742 sq. cm

128) Haresh tosses two coins (with two faces "head" and "tail" on each) simultaneously. What is the probability that he gets atleast one head?

- A)  $1/4$
- B)  $3/4$
- C)  $1/3$
- D)  $1/2$

129) A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, then what is the probability that it bears a two-digit number?

- A)  $9/10$
- B)  $8/9$
- C)  $91/100$
- D)  $1/10$

130) One side of a rectangle exceeds its other side by 2 cm. If its area is 195 sq.cm, then the length of one of the sides of the rectangle is

- A) 11 cm
- B) 13 cm
- C) 14 cm
- D) 17 cm

131) The points  $(1, 1)$ ,  $(-1, -1)$  and  $(43, 43)$  are the vertices of a

- A) Right triangle
- B) Isosceles triangle
- C) Equilateral triangle
- D) Scalene triangle

132) If the points  $(1, x)$ ,  $(5, 2)$  and  $(9, 5)$  are collinear, then the value of  $x =$

- A) 6
- B) -1
- C) 7
- D) 1

133) At a certain time of the day, a boy 5 feet tall casts his shadow 9 feet long. What is the length of the shadow cast by a building 30 feet high at the same time which is next to the boy?

- A) 34 feet
- B) 54 feet
- C) 65 feet
- D) 56 feet



134) If a hollow sphere with internal and external radii 16 cm and 32 cm respectively is melted to form a cone with base of radius 32 cm, then the height of the cone is

- A) 112 cm
- B) 141 cm
- C) 202 cm
- D) 198 cm

135) The distance between two points A(12, 0) and B(0, 5) is

- A) 13 units
- B) 12 units
- C) 15 units
- D) 16 units

136) Angle of elevation of the top of a pole from a point which is at a distance of 60 m from base of the pole is  $30^\circ$ . The height of the pole is

- A) 1212 m
- B) 15 m
- C) 2043 m
- D) 30 m

137) A metallic cone of radius 8 cm and height 16 cm is melted and made into spheres of radius 4 cm each. The possible number of spheres is

- A) 12
- B) 6
- C) 3
- D) 4

138) Hemispheres P and Q have their radii 30 cm and 10 cm respectively. The ratio of total surface area of sphere P to sphere Q is

- A) 7 : 9
- B) 5 : 9
- C) 9 : 1
- D) 5 : 1

139) If  $\theta$  is an acute angle such that  $\cot \theta = 7/8$ , then  $\tan 2\theta =$

- A)  $8/7$
- B)  $(415)/8$
- C)  $64/49$
- D)  $15/64$

140) In triangle ABC,  $\angle ABC = 90^\circ$ , AB = 3 cm and AC = 5 cm, then BC =

- A) 7 cm
- B) 5 cm
- C) 4 cm
- D) 6 cm

141) A root of the equation  $6x^2 - 5x - 25 = 0$  is

- A) 5
- B)  $-5/2$
- C)  $-5/3$
- D)  $3/5$

142) The angle of elevation of the top of a pillar from a point at a distance of 30 m from its base is  $30^\circ$ . How much should the pillar height be increased so that angle of elevation from the same point changes to  $45^\circ$ ? (Take  $\sqrt{3} = 1.732$ ,  $\sqrt{2} = 1.414$ )

- A) 10 m
- B) 17.32 m
- C) 12.68 m
- D) 15.2 m

143) The corresponding sides of two similar triangles are 2 cms and 3 cms respectively. The ratio of their areas is

- A) 3 : 2
- B) 4 : 9
- C) 6 : 4
- D) 4 : 6

144)  $\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ =$

- A) 1
- B) 0
- C) 2
- D)  $\sqrt{2}$

145) What is the value of 'k' for which the pair of equations  $x + y - 4 = 0$  and  $2x + ky - 3 = 0$  has no solution?

- A) 2
- B) 4
- C) 6
- D) 8

146) The end points of the diameter of a circle are (2, 4) and (-3, -1). The radius of the circle is

- A) 5 units
- B)  $5\sqrt{2}$  units
- C) 6 units
- D)  $5\sqrt{2}$  units

147) A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is red?

- A)  $\frac{1}{8}$
- B)  $\frac{3}{8}$
- C)  $\frac{5}{8}$
- D) 1

148) What is the locus of the point (x, y) such that the point (x, y) is equidistant from the points (3, 6) and (-3, 4)?

- A)  $x+y=5$
- B)  $3x+y=5$
- C)  $3x+2y=6$
- D)  $x+y=7$

149) What is the value of discriminant for the equation  $2x^2 + x - 1 = 0$ ?

- A) 3
- B) 8
- C) 10
- D) 9

150) Which of the following is a quadratic equation whose one root is 3?

- A)  $x^2 - 6x - 5 = 0$
- B)  $x^2 + 6x - 5 = 0$
- C)  $x^2 - 5x - 5 = 0$
- D)  $x^2 - 5x + 6 = 0$

151) The ratio of volume of a sphere of radius 5 cm to the volume of a cylinder with height 12 cm and radius 5 cm, is

- A) 1 : 1
- B) 5 : 9
- C) 3 : 7
- D) 4 : 5

152) The recurring decimal expansion  $1.\overline{27}$  can be expressed as the fraction

- A)  $\frac{14}{11}$
- B)  $\frac{19}{15}$
- C)  $\frac{23}{18}$
- D)  $\frac{127}{100}$

153) If  $\sin(A - B) = \frac{1}{2}$ ,  $\cos(A + B) = \frac{1}{2}$  where  $0^\circ < A+B < 90^\circ$ , A, B, then

- A)  $A = 45^\circ$ ,  $B = 15^\circ$
- B)  $A = 30^\circ$ ,  $B = 15^\circ$
- C)  $A = 45^\circ$ ,  $B = 25^\circ$
- D)  $A = 55^\circ$ ,  $B = 15^\circ$

154) A dice is rolled once. The sides of the dice are labelled with integers 1 through 6. What is the probability that the integer facing up on the dice is greater than 4?

- A)  $\frac{1}{2}$
- B)  $\frac{4}{5}$
- C)  $\frac{1}{3}$
- D)  $\frac{2}{3}$

155) Seven years ago a man was seven times the age of his daughter. After three years, the man will be three times the age of his daughter. Present age of the man (in years) is

- A) 12
- B) 35
- C) 45
- D) 42

156) The solution for (x, y) to the pair of linear equations  $0.2x + 0.3y = 1.3$  and  $0.4x + 0.5y = 2.3$  is

- A) (1.5, 3)
- B) (2, 3)
- C) (4, 7)
- D) (4.5, 6)

157) A man is standing on one side of the river on its bank. Angle of elevation when this man looks at the top of a mountain on the other side of the river is  $60^\circ$ . On moving 100 m away from the river bank, the angle of elevation changes to  $30^\circ$ . The width of the river is

- A) 5043 m
- B) 50 m
- C) 6042 m
- D) 10013 m

158)  $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ =$

- A) 1
- B) 2
- C) 3
- D) 0

159) Which of following is the correct combination of angles that can form similar triangles A ABC and A DEF?

- A)  $\angle A=70^\circ$ ,  $\angle C=40^\circ$ ,  $\angle E=80^\circ$ ,  $\angle F=30^\circ$
- B)  $\angle A=85^\circ$ ,  $\angle C=35^\circ$ ,  $\angle E=35^\circ$ ,  $\angle F=72.5^\circ$
- C)  $\angle A=60^\circ$ ,  $\angle C=40^\circ$ ,  $\angle E=80^\circ$ ,  $\angle F=40^\circ$
- D)  $\angle A=75^\circ$ ,  $\angle C=52.5^\circ$ ,  $\angle E=55^\circ$ ,  $\angle F=52.5^\circ$

160) Length of a rectangular garden is 5 m more than its breadth. Perimeter of the rectangular garden is 2 m more than the perimeter of a square garden with side length 22 m. Length of the rectangular garden is

- A) 15 m
- B) 20 m
- C) 30 m
- D) 25 m

161) If a polynomial  $g(x)$  of degree zero is added to the polynomial  $2x^3 + 5x^2 - 14x + 12$  so that it becomes exactly divisible by  $2x - 3$ , then

- A)  $g(x) = -8$
- B)  $g(x) = -9$
- C)  $g(x) = 7$
- D)  $g(x) = 8$

162)  $(\sec A + \tan A)(1 - \sin A) =$

- A)  $\sec A$
- B)  $\sin A$
- C)  $\operatorname{cosec} A$
- D)  $\cos A$

163) If the two zeroes of the cubic polynomial  $ax^3 + 3x^2 - bx - 6$  are  $-1$  and  $-2$ . Then

- A)  $a = 2$ ,  $b = 5$ , third zero  $= 3/2$
- B)  $a = 2$ ,  $b = 5$ , third zero  $= -3/2$
- C)  $a = 2$ ,  $b = 3$ , third zero  $= -3$
- D)  $a = 3$ ,  $b = 2$ , third zero  $= 3$

164) AABC and ADEF are two equilateral triangles. If the ratio of area of AABC to area of ADEF is  $1 : 2$  and  $AB = 3$  cm, then length of DE is equal to

- A) 342 cm
- B) 6 cm
- C) 4.5 cm
- D) 243 cm

165) If A is an acute angle such that  $\sin A = 3/4$ , then the value of  $\cos A$  is

- A)  $1/2$
- B)  $(17)/2$
- C)  $(47)/4$
- D)  $(13)/7$

166) If  $4(24 - 10x) = 3 - 4x$  where  $(3 - 4x) > 0$ , then

- A)  $x = 3/8$
- B)  $x = 1/8$
- C)  $x = -3/2$
- D)  $x = -5/8$

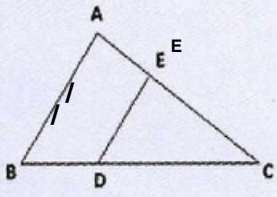
167) Two poles of heights 7 m and 13 m stand vertically upright on a plane ground. If the distance between their feet is 8 m, then the distance between their tops is equal to

- A) 13 m
- B) 10 m
- C) 17 m
- D) 25 m

168) The decimal expansion of an irrational number is

- A) Terminating
- B) Non-terminating and Recurring
- C) Non-terminating and Non-recurring
- D) NOT possible to compute

179) In the given figure,  $DE \parallel AB$ ,  $DC = 3 BD$ , area of  $ACDE = 27$  sq. cm. What is the area of the quadrilateral  $ABDE$ ?



- A) 18 sq. cm
- B) 21 sq. cm
- C) 24 sq. cm
- D) 27 sq. cm

180) A ladder is resting on a vertical wall with its foot resting on the ground 6 feet away from the wall. A woman on the ground climbs  $\frac{2}{3}$  of the ladder. At what distance is she now from the wall?

- A) 2 feet
- B) 3 feet
- C) 4 feet
- D) 6 feet