DMRC–Junior Engineer (Electrical)
Online Exam-2017*

PAPER-I

General Awareness, General Intelligence & Reasoning and Quantitative Aptitude

1. Which district in India is largest in terms of area?
   A. Jodhpur in Rajasthan
   B. Kachchh in Gujarat
   C. Anantpur in Andhra Pradesh
   D. Leh in Jammu and Kashmir

2. Which river in India is known as 'The Sorrow of Bihar'?
   A. Palgu   B. Durgavati
   C. Kosi   D. Kamala

3. Who was the Chairman of the 14th Finance Commission of India?
   A. Y.V. Reddy   B. Manmohan Singh
   C. Kaushik Basu   D. D. Subba Rao

4. In which year was the one-hundredth Amendment Act of Indian Constitution passed?
   A. 2013   B. 2010
   C. 2009   D. 2015

5. Who founded the Gupta Dynasty?
   A. Varahmihira   B. Chandra Gupta I
   C. Samudra Gupta   D. Narasimha

6. Which Article of the Indian Constitution prohibits child labour?
   A. Article 24   B. Article 34
   C. Article 21   D. Article 44

7. What was constituted by the Government of India to replace the planning commission?
   A. NITI Aayog   B. Exim Bank
   C. NREGA   D. NDC

8. Where is the Ramganga hydroelectric project located in India?
   A. Goa   B. Rajasthan
   C. West Bengal   D. Uttarakhand

9. Who is the present Chief Minister of Uttarakhand?
   A. Harish Rawat   B. Ramesh Pokhriyal
   C. Vijay Bahuguna   D. N.D. Tiwari

10. Who is the present Union Minister of Corporate Affairs in India?
   A. Ravi Shankar Prasad
   B. Ram Vilas Paswan
   C. Arun Jaitley
   D. Ananth Kumar

11. Which mobile app (upgraded version) was launched by the union Government in December 2016 for an efficient monitoring of village electrification?
   A. Indelec   B. Garv II
   C. Indosoft   D. BHIM

12. In which year was the Life Insurance Corporation of India founded?
   A. 1961   B. 1956
   C. 1951   D. 1959

13. In which year was the Pitt's India Act passed?
   A. 1884   B. 1892
   C. 1784   D. 1760

14. Under the reign of which Governor General, was the first railway started in India in 1853?
   A. Lord Dalhousie   B. Lord Cannings
   C. Lord Cornwallis   D. Lord Mountbatten

15. Who was the first Indian woman to win an Olympic Medal?
A. Karnam Malleswari
B. P.T. Usha
C. Ashwini Nachappa
D. Saina Nehwal

16. Sixty litres of wine is drawn from 600 litres of wine and replaced with equal quantity of water. Sixty litres of the mixture is then drawn and replaced with equal amount of water and this procedure is repeated once more. Find the per cent quantity of wine in the mixture.
A. 420 litres
B. 393.66 litres
C. 486 litres
D. 437.4 litres

17. Two numbers are in the ratio of 7 : 9 and their difference is 54. Find the sum of the numbers.
A. 403
B. 404
C. 432
D. 401

18. Find the remainder when $f(x) = x^2 + 6x + 8$ is divided by $2x + 1$.
A. $2\dfrac{1}{3}$
B. $6\dfrac{1}{5}$
C. $5\dfrac{1}{4}$
D. $4\dfrac{1}{3}$

19. Ajay sold his cycle at a loss of 9%. If he would have sold it for ₹ 75 more, he would have made a profit of 16%. Find the cost of the cycle.
A. ₹ 100
B. ₹ 300
C. ₹ 200
D. ₹ 350

20. A man moving at a speed of 36 kmph covered the shadow of a tower of height 75 m in 3 seconds. If the height of the person is 1.75 m, the length of the shadow cast by the man in metres is:
A. 1
B. 0.7
C. 0.5
D. 1.5

21. The average of three consecutive numbers is 240. Find the numbers.
A. 238, 240, 242
B. 240, 241, 242
C. 239, 240, 241
D. 238, 239, 240

22. Two taps A and B can fill a tank in 20 minutes and 30 minutes respectively. If both the taps are opened simultaneously and tap A is closed after 5 minutes, what is the total time in which the tank is filled?
A. 14.5 minutes
B. 25 minutes
C. 22.5 minutes
D. 20 minutes

23. What is the LCM of $\left(\dfrac{6}{4}, \dfrac{6}{9}, \dfrac{5}{4}\right)$?
A. 30
B. 10
C. 60
D. 20

24. If 3 tan A = 4, find $\sin^2 A - \cos^2 A$?
A. 1
B. $\dfrac{6}{25}$
C. $\dfrac{9}{25}$
D. $\dfrac{7}{25}$

25. Anil and Bharath are cycling around a circular track of length 300 m with respectively speeds of 8 m/sec and 12 m/sec. After how many seconds do theymeet for the first time. If they are running in (*a*) the same direction and (*b*) opposite direction?
A. 120, 40
B. 60, 40
C. 75, 15
D. 90, 30

26. Find the sum of:
$$\frac{1}{1^3} + \frac{1+2}{1^3+2^3} + \frac{1+2+3}{1^3+2^3+3^3} + \ldots + \frac{1+2+3+\ldots+n}{1^3+2^3+3^3+\ldots+n^3}$$
A. $\dfrac{2n}{n+1}$
B. $n(n+1)$
C. $2n(n+1)$
D. $\dfrac{n}{n+1}$

27. Suresh found the HCF of two numbers using the division method. In doing so he found the quotients are 1, 1, 1, 2 in that order. The final divisor was 40. Find the two numbers.
A. 200, 320
B. 324, 484
C. 200, 310
D. 720, 928

28. A person invested 1/3rd of his sum at 6%, 1/6% at 12% and the rest at 14%. If the simple interest for 2 years from all the investments amounts to ₹ 55,000. Find the sum.
A. ₹ 3,00,000
B. ₹ 2,55,000
C. ₹ 2,50,000
D. ₹ 3,50,000

29. Express $0.13\overline{6}$ in the form of a fraction.

   A. $\dfrac{3}{22}$ B. $\dfrac{17}{19}$

   C. $\dfrac{12}{15}$ D. $\dfrac{13}{16}$

30. Express 450 gram as a per cent of 5 kg 600 grams.

   A. $8\dfrac{1}{28}\%$ B. $8\dfrac{1}{26}\%$

   C. $7\dfrac{1}{28}\%$ D. $7\dfrac{1}{26}\%$

31. Which character can replace the question mark?

L	M	Y
E	G	L
L	C	?

   A. L   B. O
   C. V   D. M

32. Ankit is facing North-West. He turns 90° in clockwise direction and then 135° in the anticlockwise direction. Now Ankit is facing which direction?
   A. East   B. South-East
   C. West   D. South

33. Complete the series given below
   B, C, E, H, ?
   A. O   B. L
   C. M   D. Q

34. If A = 2, L = 24, T = 40, then CAR is numbered as:
   A. 64   B. 44
   C. 54   D. 48

35. Complete the series given below
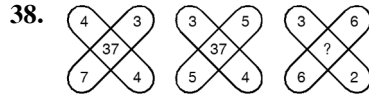   D, G, J, M, P, ?
   A. S   B. V
   C. T   D. U

36. P is Q's Sister, R is Q's Mother, S is R's father, T is R's mother, then how P is related to S?
   A. Grand father   B. Grand daughter
   C. Sister   D. Grand mother

37. Amol said, "This girl is the wife of the grand-son of my mother". Who is Amol to the girl?
   A. Husband   B. Father
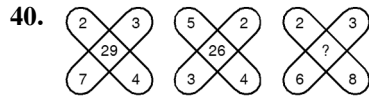   C. Father-in-law   D. Grand father

38.

Look at the pattern above. What comes in the place of question mark?
   A. 55   B. 42
   C. 56   D. 37

39. What best suits the relation.
   Food : Stomach : : Fuel : ?
   A. Automobile   B. Truck
   C. Engine   D. Plane

40.

Look at the pattern above. What comes in the question mark?
   A. 34   B. 29
   C. 42   D. 26

41. Complete the series given below:
   0, 2, 6, 12, 20, 30, 42, ?.
   A. 60   B. 64
   C. 56   D. 50

42. If in a certain language, GINGER is coded as HJOHFS, How SALT can be coded as?
   A. TRAMA   B. TINKU
   C. THAU   D. TBMU

43. In a certain code, the word STOVE is coded as 19-20-15-22-5. Following the same rule of coding, what should be the code for the word SOME?
   A. 13-15-5-19   B. 13-19-15-5
   C. 19-13-1-5   D. 19-15-13-5

44. Complete the series given below:
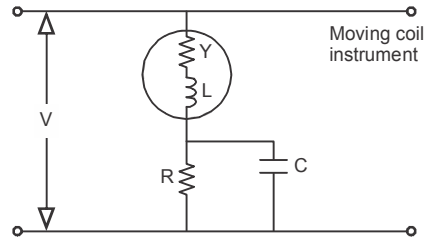   9 : 81 : : 11 : ?
   A. 100   B. 10
   C. 121   D. 120

45. Complete the series given below:
   2, 5, 10, 17, 26, 37, ?.
   A. 40   B. 50
   C. 49   D. 42

Knowledge of Discipline / Trade (Electrical Engineering)

46. The active power in a delta connected system of 440 V with a balanced load of inductive reactance of 3Ω & resistance of 4Ω per phase is:
A. 1468 kW
B. 846.35 kW
C. 92.92 kW
D. 28.57 kW

47. The full load efficiency at unity power factor of a 230/115 V, 2kVA single phase transformer having a Cu loss of 60 W at half load and iron load of 50 W is:
A. 92%
B. 87%
C. 90%
D. 98%

48. An electrical short circuit is characterized by:
A. High resistance
B. Medium resistance
C. Zero resistance
D. Infinite resistance

49. Active Power in a 3 phase system may be calculated as:
A. $P = \sqrt{3}V_L I_L \cos\varphi$
B. $P = V_L I_L \cos\varphi$
C. $P = \sqrt{3}V_L I_L$
D. $P = \sqrt{3}V_{ph} I_{ph} \cos\varphi$

50. Leakage current allowed by IE rules is:
A. 1/500 parts of the total current
B. 1/5000 parts of the total current
C. 1/1500 parts of the total current
D. 1/3000 parts of the total current

51. An electric bulb of rating 40W, 220V is used for 10 hours daily for 10 days. Energy consumed is:
A. 3 kWh
B. 4 kWh
C. 6 kWh
D. 5 kWh

52. Reactance of the stator winding of an alternator at the instant of short circuit at its terminals is called:
A. Sub-transient reactance
B. Synchronous reactance
C. Transient reactance
D. Per-unit reactance

53. Electric charge of a body is a condition due to:
A. Deficiency or excess of neutrons
B. Deficiency of electrons
C. Deficiency or excess of electrons
D. Excess of electrons

54. In a synchronous motor, the rotor copper losses are met by:
A. Supply mains
B. Armature input
C. Motor input
D. DC source

55. In magnetism, the equivalent of unit N/wb is:
A. Tesla
B. A/m
C. V/cm
D. J/wb

56. Curie point is:
A. The voltage at which a magnetic material loses its magnetic property.
B. The temperature at which a magnetic material loses its magnetic property.
C. The voltage at which a magnetic material gains its magnetic property.
D. The temperature at which a magnetic material gains its magnetic property.

57. 1 Volt = _____ .
A. 1 Joule/1 Coulomb
B. 1 Watt/1 Ohm
C. 1 Joule/1 Watt
D. 1 Watt/1 Coulomb

58. Fractional horse power motors have power less than:
A. 1 Kilo Watt
B. 1 Mega Watt
C. 1 Watt
D. 100 Watt

59. A three phase induction motor is analogous to:
A. Rotating transformer
B. Rotating motor
C. Generator
D. Rotating converter

60. The average of all the instantaneous values of a sinnoisdal quantity over a cycle is:
A. 0.707 times its maximum value

B. Unity

C. Maximum

D. Zero

61. When used as an amplifier, the transistor configuration which will give maximum gain is:

A. Common base

B. Common emitter

C. Both common emitter & common base

D. Common collector

62. For applications which require smooth and precise speed control over wide range, the motor preferred is:

A. Squirrel cage induction motor

B. Wound rotor induction motor

C. DC motor

D. Synchronous motor

63. The rotor of an induction motor cannot run at synchronous speed because:

A. Stator flux would then become zero.

B. Losses would increase.

C. Rotor torque would then become zero.

D. Induction rotor would then become synchronous motor

64. A 3 phase circuit breaker is rated at 1200 A, 2000 MVA, 100 KV, 4 sec. The rated symmetrical breaking current is:

A. 1.67 KA   B. 20 KA

C. 11.55 KA   D. 300 KA

65. In capacitor start-capacitor run motor, the starting and running capacitors respectively are:

A. Oil capacitor, electrolytic

B. Electrolytic, oil capacitor

C. Electrolytic, mica capacitor

D. Mica capacitor, oil capacitor

66. In a power system, active power control is related to:

A. Both Voltage and frequency control

B. Frequency control

C. Voltage control

D. Steam control

67. Power factor of a parallel RLC circuit at resonance is:

A. Unity   B. Zero

C. 0.707 leading   D. 0.707 lagging

68. Find the line current under measurement, if a 100 : 5 CT is used in conjunction with a (0-5 A) ammeter reads 3A:

A. 70 A   B. 35 A

C. 60 A   D. 15 A

69. The unit of magnetomotive force is:

A. Wb/S   B. Wb

C. AT/Wb   D. AT

70. In measuring instruments, damping force can be produced by:

A. Commutator   B. Moving coil

C. Eddy current   D. Supply current

71. The purpose of capacitor in the figure is:

A. To compensate for the error due to supply variation

B. To bypass the resistor R

C. To compensate for the frequency error

D. To increase the impedance

72. Moving iron type meter has non-linear scale as:

A. $\theta \propto I_{rms}^2$ B. $\theta \propto R^2$

C. $\theta \propto V_{rms}$ D. $\theta \propto I_{rms}$

73. The transformer core laminations are insulated from each other by:

A. Cotton

B. Paper

C. Mica strip

D. Thin coat of varnish

74. The rates for consumption of 250 kWh at block rate tariff is quoted as:

1. First 20 kWh at 60 paise/kWh

2. Next 25 kWh at 50 paise/unit
3. Next 35 kWh at 40 paise/unit
4. Exceeding 80 kWh at 30 paise/unit.
The average cost per unit of consumption is:
A. 33.4 paise/kWh   B. 89.4 paise/kWh
C. 35.8 paise/kWh   D. 53.8 paise/kWh

75. Salt solutions are:
A. Insulators
B. Semi-conductors
C. Good conductors of electricity
D. Do not poses electrical properties

76. For the given circuit shown, the current supplied by the battery is:
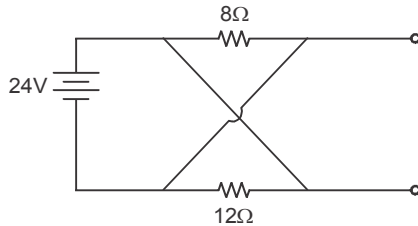
A. 5 A   B. 3 A
C. 1.2 A   D. 2 A

77. Inside a conducting sphere, _____ remains constant.
A. Potential
B. Charge
C. Electric flux density
D. Current

78. The equivalent inductance (L_1) of two inductors L_A and L_B is series having mutual inductance of M with cumulative connection is:
A. $L_1 = L_A + L_B - 2M$
B. $L_1 = L_A + L_B + M$
C. $L_1 = L_A + L_B + 2M$
D. $L_1 = L_A + L_B - M$

79. The approximate continuous range of a motor for a load of 100 HP for 20 minutes, at 1/4th load for next 10 minutes and a no load for need 20 minutes is:
A. 72 HP   B. 78 HP
C. 97 HP   D. 65 HP

80. The time constant of a R-L circuit is:
A. R/L   B. R^2/L
C. L^2/R D. L/R

81. At the instant of starting, the slip of induction motor is:
A. Lagging   B. Unity
C. Zero   D. Leading

82. According to double field revolving theory, the rotor of a single phase induction motor may be visualized as:
A. Two rotors running in opposite direction with different stator windings
B. Two rotors running in same direction with common stator winding
C. Two rotors running in same direction with different stator winding
D. Two rotors running in opposite direction with a common stator winding

83. For a RLC series circuit, the current at resonance is:
A. Minimum   B. Maximum
C. V/L   D. Zero

84. The rms value of a half wave rectified wave is:
A. $0.707\ I_m$ B. $0.5\ I_m$
C. $0.637\ I_m$ D. $0.8\ I_m$

85. Calculate the power taken by each of the two resistors of value 100 Ω, connected in parallel across 100 V supply.
A. 1500 W   B. 1.5 W
C. 100 W   D. 2000 W

86. For the circuit shown find I:
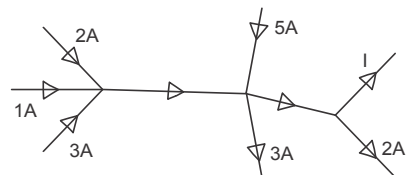
A. 3 A   B. 0 A
C. 6 A   D. 1 A

87. Form factor of a sinusoidal voltage is:
A. 0.632   B. 1.11
C. 1.414   D. 0.707

88. During charging of a capacitor of C = 100 μF through a resistance of 1 kΩ applied with 100 V, the voltage at time constant is _____.
A. 36.7 V
B. 63.2 V
C. 100 V
D. 63.7 V

89. Inductance is the property to:
A. Oppose the change in resistance
B. Oppose the change in frequency
C. Oppose the change in current
D. Oppose the change in voltage

90. In Direct On Line starter, no volt release is to:
A. Safe guard against supply fluctuations
B. Safe guard the motor against sudden failure of supply
C. Safe guard against over load
D. Safe guard against earth faults

91. The scientist who first observed the relation between electricity and magnetism is:
A. Ohm
B. Michael Faraday
C. Thomas Alva Edison
D. Hans Christian Oersted

92. The value of free electron density of copper is:
A. $16 \times 10^{28}/m^3$
B. $1.69 \times 10^{19}/m^3$
C. $8 \times 10^{28}/m^3$
D. $8.5 \times 10^{28}/m^3$

93. When over excited, synchronous motor has:
A. Leading power factor
B. Zero power factor
C. Unity power factor
D. Lagging power factor

94. Plugging method of braking is applied to induction motor by:
A. Opening the rotor and connecting across the resistance
B. Reversing the rotor current externally
C. Interchanging two phases of stator
D. Reducing the applied voltage

95. In case of leading load power factor, the terminal voltage of an alternator will:
A. Fall on removing the full load
B. Rise on removing the full load
C. Rise on adding the full load
D. Fall on adding the full load

96. A magnetic flux of 300 mWb in a coil of 100 turns is reverted in 0.2 seconds. The average emf induced is:
A. 600 V
B. −300
C. −600
D. 300 V

97. The power factor of load, when one of the wattmeters indicate a negative reading during the 3 phase power measurement using two wattmeter method is:
A. Below 0.5
B. Unity
C. Above 0.5
D. Above 0.707

98. When reverse biased, a PN junction diode acts as:
A. A short circuit
B. A rectifier
C. An amplifier
D. An open circuit

99. The angular velocity of a sinusoidal voltage is:
A. $\omega = 1/T$
B. $\omega = 2\pi/f$
C. $\omega = T/f$
D. $\omega = 2\pi f$

100. In case of zero power factor leading load on alternator, the effect of armature reaction is:
A. To cross-magnetize
B. To decrease the induced emf
C. To de-magnetize
D. To increase the induced emf

101. Which of the following instruments will give accurate reading in both AC and DC instruments?
A. Induction Wattmeter
B. PMMC voltmeter
C. Dynamometer type Wattmeter
D. Ampere-hour mercury meter

102. A coil of resistance 10 Ω and inductance 2 H is connected to 100 V DC supply through a switch. The initial rate of change of current at the instant of closing the switch is:
A. 5 V/sec
B. 50 V/sec
C. 10 V/sec
D. 100 V/sec

103. The machine used for power factor correction is:
A. Induction generator
B. Universal motor
C. Stepper motor
D. Synchronous motor

104. Commonly used method of welding to make lap welds in thin sheets is:
A. Carbon arc welding
B. Spot welding
C. Butt welding
D. Flash welding

105. The number of electrons constituting 1 C of charge is:
A. 8.854×10^9 　　B. 4×10^7
C. 0.625×10^{19} 　D. 1.6×10^{19}

106. A PMMC meter can be used as an ammeter using:
A. Series resistors 　B. Shunt inductors
C. Shunt resistors 　D. Series inductors

107. Current transformers (CT) are used for:
A. Measurement of frequency
B. Measurement of large DC currents
C. Measurement of large alternating currents
D. Measurement of high voltage

108. The motor having a smooth chrome-steel cylinder as its rotor with no rotor winding is:
A. Universal motor 　B. Hysteresis motor
C. Repulsion motor 　D. Reluctance motor

109. Dielectric heating is an industrial method employed for heating of:
A. Solids
B. Conducting materials
C. Liquids
D. Insulating materials

110. Megger is used for the measurement of:
A. Low resistance
B. Insulation resistance
C. Stray resistance
D. Earth resistance

111. Permittivity of air is:
A. 9×10^9 F/m 　　B. 8.854×10^{-12} F/m
C. $4\pi \times 10^{-7}$ F/m 　D. 8.987×10^{-9} F/m

112. The time multiplier for an inverse time relay is:
A. $TMS = T \times T_M$ 　B. $TMS = T / T_M$
C. $TMS = T_M / T$ 　　D. $TMS = T / \sqrt{2}T_M$

113. Select the wrong statement. Coils of electric kettle and electric irons are made of alloys rather than pure metal because:
A. Alloys do not oxidize easily
B. Resistivity changes is less rapid in alloys than in pure metals
C. Resistivity of alloys is higher than that of pure metals
D. Thermal expansion of alloys is lesser than that of pure metals

114. The value of resistance in a potential divider arrangement to convert a basic d'Arsonval meter movement with an internal resistance of 100 Ω and a full scale current of 1 mA to a multi range DC voltmeter with ranges 0-150 V and 0-300 V are:
A. 149.5 kΩ, 155.5 kΩ
B. 144.5 kΩ, 140 kΩ
C. 135.5 kΩ, 134 kΩ
D. 149.9 kΩ, 150 kΩ

115. The power in a delta connected system is ____ times the power in star system:
A. 2 　　　　　　　　B. 1/3
C. $1/\sqrt{3}$ 　　　　　D. 3

116. An energy meter is designed to make 100 revolutions for one unit of energy. The number of revolutious when connected to a load of 40 A, at 230 V and 0.95 power factor lagging for an hour is:
A. 657 　　　　　　　B. 874
C. 362 　　　　　　　D. 530

117. What is the efficiency of a lamp of 230 V, producing total flux of 3000 lumens when taking a current of 1 A?
A. 65 　　　　　　　　B. 13
C. 16 　　　　　　　　D. 80

118. In FHP induction motors, splitting the phase is done using:
A. Only capacitor
B. Only resistance
C. Resistance/capacitor
D. Resistance/inductance

119. Buchholz relay is used for the protection of:
  A. Transformers
  B. DC motors
  C. AC motors
  D. Alternators

120. The motor used in electric traction is:
  A. DC shunt motor
  B. Single phase induction motor
  C. Three phase induction motor
  D. Synchronous motor

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	C	A	D	B	A	A	D	A	C

11	12	13	14	15	16	17	18	19	20
B	B	C	A	A	D	C	C	B	B

21	22	23	24	25	26	27	28	29	30
C	C	C	D	C	A	A	C	A	A

31	32	33	34	35	36	37	38	39	40
B	C	B	B	A	B	C	B	C	A

41	42	43	44	45	46	47	48	49	50
C	D	D	C	B	C	B	C	A	B

51	52	53	54	55	56	57	58	59	60
B	A	C	D	B	B	A	A	A	D

61	62	63	64	65	66	67	68	69	70
B	C	C	C	B	B	A	C	D	C

71	72	73	74	75	76	77	78	79	80
C	A	D	C	C	A	A	C	A	D

81	82	83	84	85	86	87	88	89	90
B	D	B	B	C	C	B	B	C	B

91	92	93	94	95	96	97	98	99	100
D	D	A	C	A	D	A	D	D	D

101	102	103	104	105	106	107	108	109	110
C	B	D	B	C	C	C	B	D	B

111	112	113	114	115	116	117	118	119	120
B	B	D	D	D	B	B	C	A	C

EXPLANATORY ANSWERS

16. $600\ l - 60\ l = 540\ l$
Amount of wine left

$$= 540\left(1-\frac{60}{600}\right)^2 = 540\left(1-\frac{1}{10}\right)^2$$

$$= 540\left(\frac{9}{10}\right)^2 = 540\times\frac{81}{100} = 437.4\ l.$$

17. Let numbers are $7x$ and $9x$
According to the question,

$$9x - 7y = 54$$
$$\Rightarrow \qquad 2x = 54$$
$$\therefore \qquad x = 27$$
$$9x = 9 \times 27 = 243$$

$$7x = 7 \times 27 = 189$$

Sum of the numbers

$$= 243 + 189$$
$$= 432.$$

18. ∵ $\qquad 2x + 1 = 0 \Rightarrow x = -\dfrac{1}{2}$

$$x^2 + 6x + 8 = \left(-\dfrac{1}{2}\right)^2 + 6\left(-\dfrac{1}{2}\right) + 8$$

$$= +\dfrac{1}{4} - 3 + 8$$

$$= 5 + \dfrac{1}{4} = \dfrac{21}{4} = 5\dfrac{1}{4}$$

Hence, the remainder = $5\dfrac{1}{4}$.

19. Let C.P. of the cycle = ₹ x

Case I : $\qquad$ SP = $x\left(1 - \dfrac{9}{100}\right) = \dfrac{91x}{100}$

Case II : $\qquad$ SP = $x\left(1 + \dfrac{16}{100}\right) = \dfrac{116x}{100}$
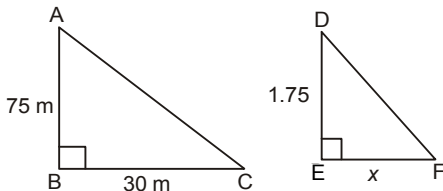
According to the question,

$$\dfrac{116x}{100} - \dfrac{91x}{100} = 75$$

⇒ $\qquad \dfrac{25x}{100} = 75$

⇒ $\qquad x = 75 \times 4 = 300$

Hence, cost price of the cycle = ₹ 300.

20.

$$36 \text{ km/hr} = 36 \times \dfrac{5}{18} \text{ m/s} = 10 \text{ m/s}$$

∴ $\qquad$ Distance = $10 \times 3 = 30$ m

Δ ABC ~ Δ DEF

∴ $\qquad \dfrac{75}{1.75} = \dfrac{30}{x}$

⇒ $\qquad x = \dfrac{30 \times 175}{75 \times 100}$

⇒ $\qquad x = \dfrac{7}{10} = 0.7$

Hence, length of the shadow cost by the man
$$= 0.7 \text{ m.}$$

21. Let x, $x + 1$ and $x + 2$ are three consecutive numbers

According to the question,

$x + x + 1 + x + 2 = 240 \times 3$

⇒ $\qquad 3x + 3 = 720$

⇒ $\qquad 3x = 717$

⇒ $\qquad x = \dfrac{717}{3} = 239$

∴ Numbers are 239, 240, 241.

22. (A + B)'s 1 minute work

$$= \dfrac{1}{20} + \dfrac{1}{30}$$

$$= \dfrac{3 + 2}{60} = \dfrac{5}{60} = \dfrac{1}{2}$$

(A + B)'s 5 minutes work

$$= \dfrac{1}{12} \times 5 = \dfrac{5}{12} \text{ part}$$

Remaining part = $1 - \dfrac{5}{12} = \dfrac{7}{12}$

∵ $\dfrac{1}{30}$ part B fill in 1 minute

∴ $\dfrac{7}{12}$ part B fill in $30 \times \dfrac{7}{12}$ minute

$$= \dfrac{35}{2} = 17.5 \text{ minutes}$$

Hence, total time taken to tank filled

$$= (17.5 + 5) \text{ minutes}$$
$$= 22.5 \text{ minutes.}$$

23. L.C.M. of $\left(\dfrac{6}{4}, \dfrac{6}{9}, \dfrac{5}{4}\right)$

$$= \dfrac{\text{L.C.M. of numerator}}{\text{H.C.F. of denominator}}$$

$$= \dfrac{\text{L.C.M. of (4, 6, 5)}}{\text{H.C.F. of (6, 9, 4)}}$$

$$= \dfrac{60}{1} = 60.$$

24. 3 tan A = 4

$\therefore \qquad \tan A = \dfrac{4}{3} = \dfrac{p}{b}$

$\therefore \qquad h = \sqrt{p^2 + b^2}$

$\qquad\qquad = \sqrt{16+9} = \sqrt{25} = 5$

$\qquad \sin A = \dfrac{p}{h} = \dfrac{4}{5}$

$\qquad \cos A = \dfrac{b}{h} = \dfrac{3}{5}$

$\therefore \ \sin^2 A - \cos^2 A = \left(\dfrac{4}{5}\right)^2 - \left(\dfrac{3}{5}\right)^2$

$$= \dfrac{16}{25} - \dfrac{9}{25} = \dfrac{7}{25}.$$

25. They are running in same direction, then time to meet each other

$$= \dfrac{300}{12-8} = \dfrac{300}{4} = 75 \text{ seconds}$$

They are running in opposite direction, then time to meet each other

$$= \dfrac{300}{12+8} = \dfrac{300}{20} = 15 \text{ seconds.}$$

26. $\dfrac{1}{1^3} + \dfrac{1+2}{1^3+2^3} + \dfrac{1+2+3}{1^3+2^3+3^3} + ... + \dfrac{1+2+3+...+n}{1^3+2^3+3^3+...+n^3}$

$$= \dfrac{2n}{n+1}.$$

27. $\because$ Final divisor = 40

$\therefore$ H.C.F. = 40

No any other numbers are divided by 40 except 200, 320

Hence, required numbers are 200, 320

```
200) 320 (1
     200
     120) 200 (1
          120
        × 80) 120 (1
               80
             40) 80 (2
                 80
                 ×
```

28. Let sum = ₹ x

$\text{S.I.} = \dfrac{x}{3} \times \dfrac{6\times 2}{100} + \dfrac{x}{6} \times \dfrac{12\times 2}{100} + \dfrac{x}{2} \times \dfrac{14\times 2}{100}$

$\Rightarrow \qquad 55000 = \dfrac{4x}{100} + \dfrac{4x}{100} + \dfrac{14x}{100}$

$\Rightarrow \qquad 22x = 55000 \times 100$

$\Rightarrow \qquad x = 5000 \times 50$

$\qquad\qquad = 250000$

Hence, $\qquad$ Sum = ₹ 2,50,000.

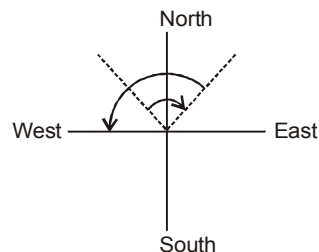**29.** $\qquad 0.1\overline{36} = \dfrac{136-1}{990} = \dfrac{135}{990}$

$$= \dfrac{27}{198} = \dfrac{3}{22}.$$

30. Let $x\%$ of 5600 gram = 450

$\Rightarrow \qquad \dfrac{x}{100} \times 5600 = 450$

$\Rightarrow \qquad x = \dfrac{450}{56} = \dfrac{225}{28} = 8\dfrac{1}{28}\%.$

32.

Hence, Ankit is facing in West direction.

33.

B   C   E   H   [L]

+ 1   + 2   + 3   + 4

Hence, L will come at the place of question mark.

34. ∵ A = 2, L = 24, T = 40

Then   C   A   R

         ↓   ↓   ↓

         6 + 2 + 36

            = 6 + 38

            = 44.

35.

D   G   J   M   P   [S]

+ 3   + 3   + 3   + 3   + 3

Hence, S will come at the place of question mark.

36. ∵ P is sister of Q

R is mother of Q

S is father of R

T is mother of R

∴ R is mother of P

S is father of R

∴ P is grand daughter of S.

37.

Amol — Girl

Son

Wife

Mother — Grand Son

Hence, Amol is father-in-law of girl.

38.

4	3		3	5		3	6
37			37			?	
7	4		5	4		6	2

7 × 3 = 21   5 × 5 = 25   6 × 6 = 36

4 × 4 = 16   3 × 4 = 12   3 × 2 = 6

Total = 37   Total = 37   Total = 42

Hence, 42 will come at the place of question mark.

40.

2	3		5	2		2	3
29			26			?	
7	4		3	4		6	8

7 × 3 = 21   3 × 2 = 6   6 × 3 = 18

2 × 4 = 8   5 × 4 = 20   2 × 8 = 16

Total = 29   Total = 26   Total = 34

Hence, 34 will come at the place of question mark.

41.

0   2   6   12   20   30   42   [56]

+ 2   + 4   + 6   + 8   + 10   + 12   + 14

Hence, 56 will come at the place of question mark.

42. G I N G E R   is coded as   H J O H F S

+ 1

+ 1

+ 1

+ 1

+ 1

+ 1

Similarly,

S A L T   is coded as   T B M U

+ 1

+ 1

+ 1

+ 1

43. In a certain code,

    S   T   O   V   E   is coded as

    ↓   ↓   ↓   ↓   ↓

   19 20 15 22   5

Similarly,

    S   O   M   E   is coded as

    ↓   ↓   ↓   ↓

   19 15 13   5

44. 9 : 81 : : 11 : ?

   ↓   ↓

  9^2 = 81 11^2 = 121

Hence, 121 will come at the place of question mark.

45.

2   5   10   17   26   37   50

+ 3   + 5   + 7   + 9   + 11   + 13

Hence, 50 will come at the place of question mark.

PAPER-II

GENERAL ENGLISH

Directions (Qs No. 1 to 5): *Read the passage given below and then answer the five questions that follow it by choosing the best option:*

Even now, well into the second decade of the 21st century, we tend to view video games as a guilty pleasure. For anyone over the age of 25, they're often something you sneak off to do when no one is at home. They're a secretive indulgence, filled with the cultural equivalent of empty calories.

Partly this is to do with how video games have been marketed for the last 30 years – mostly at teenage boys. The games industry has taught us to see games as loud, rude and mysterious. On top of this, the most visible titles tend to conform to familiar stereotypes: *Call of Duty* is about killing enemies; *Candy Crush Saga* is about killing time. Because teenagers bury themselves in these games, they don't see how these corporate entities creep into their thinking and personality.

But, the last five years has seen a huge rebirth in video game design. The democratisation of the medium – through cheap development tools and the rise of super-fast broadband - has brought in new voices and ideas. Fascinating things are happening.

In a lot of important ways, almost all games can be shared. Couples can bond better when they sit down and play adventure games together, taking turns with the controls, helping each other, discussing tactics and options. Playing video games with your kids, in a domain they enjoy and feel comfortable, is a joyous experience. It lets them take the lead; it lets them show you stuff. The skills are also transferable and can expand into the real world. Watching our friends through play reveals hidden aspects of their personality and character. Incidentally, games can offer practice in talking to machines.

1. The author, in the passage, does NOT convey the idea that:
   A. videogames have always been good and universal
   B. in their evolution, videogames have widened their user-base
   C. changes in videogame design have led to welcome effects on the players
   D. videogames might have been teen-centric and harmful, but are no longer so

2. Changes in videogame design have brought in new ideas; therefore, videogames are no longer:
   A. necessarily loud and rude
   B. exclusive but shareable with others
   C. a secretive indulgence
   D. targeted at the teenagers and their likes

3. The third paragraph observes that in videogame designing 'new voices and ideas' have been brought in; the word 'voices' as used here refers to:
   A. conversation between couples or parents and children while playing new video games
   B. videogames being able to hear and respond to what players say aloud
   C. different opinions about and attitudes to the game-design acceded to by designers
   D. imaginary speeches heard by insane people in their minds, especially during gaming

4. *The democratization of the medium* means:
   A. widening the audience-base
   B. collectively taking decisions about videogame design
   C. conducting elections in the industry
   D. making changes whereby older adults and women, besides children, were included

5. Which ONE of the following is *NOT* a difference between older and newer designs?
A. chance to show-off gaming skills
B. target audience
C. developing healthier attitudes
D. collective play

6. Transform the following sentence into Reported Speech:

The manager said, "Confirmation of his program will arrive soon by fax."
A. The manager said that confirmation of his program will arrive shortly by fax.
B. The manager said that confirmation of his program would arrive immediately by fax.
C. The manager said that confirmation of his program would arrive soon by fax.
D. The manager said that confirmation of his program would have arrived shortly by fax.

7. Transform the sentence in active voice into a sentence in passive voice; decide if the agent is to be retained or not:

The police have filed the charge sheet in the crime, naming a popular leader as the accused.
A. The charge sheet in the crime, a popular leader being named as the accused, was filed by the police.
B. The charge sheet in the crime, naming a popular leader as the accused, has been filed by the police.
C. The charge sheet in the crime, a popular leader being named as the accused, had been filed by the police.
D. The charge sheet in the crime, a popular leader being named as the accused, has been filed by the police.

8. Transform the sentence in active voice into a sentence in passive voice; decide if the agent is to be retained or not:

Schools are teaching students to memorize content, including problems and their solution:

A. Students are being taught by schools, to memorize content including problems and their solution.
B. Students are taught to memorize content, including problems and their solution by schools.
C. Students are to be taught to memorize content, including problems and their solution by schools.
D. Students are being taught to memorize content, including problems and their solution.

9. Choose the antonym or the word which is of contrary meaning to the underlined words:

When private investment is <u>nervous,</u> public investment must step in
A. Calm   B. Relaxed
C. Confident   D. Deficient

10. Choose the correct preposition from the options given against each and complete the text:

We perceived a recurring cycle .... the evolution of technologies.
A. in   B. at
C. on   D. of

11. Choose the antonym or the word which is of contrary meaning to the underlined words:

Maintain a clear <u>distinction</u> between news, critical analysis, and opinion
A. Uniqueness   B. Openness
C. Union   D. Excellence

12. Which of these adverbs is the most suitable to complete the sentence:

Ali is .... planning to go tonight.
A. still   B. always
C. until   D. often

13. Choose the antonym or the word which is of contrary meaning to the underlined words:

The world has changed but the principles remain vital for us: <u>fairness</u> and justice.
A. Black   B. Partiality
C. Difference   D. Wrong

14. Choose the word which is closest in meaning to the underlined word:

The writer did not want to hurt anyone's ego, but <u>reveal</u> the truth.
A. Disclose   B. Picture
C. Enclose   D. Strip

15. Transform the following sentence into Reported Speech:

I asked Mary, "What's happening to your approved schedule?"
A. I want to know from Mary as to what is happening to her approved schedule.
B. I questioned Mary about what is happening to her approved schedule.
C. I wanted to know from Mary as to what had been happening to her approved schedule.
D. I questioned Mary about what was happening to her approved schedule.

16. Fill in the blank by choosing the best option: Temperatures in Delhi are .... to drop further next week.
A. forecasts   B. forecast
C. forecasteing   D. forecasting

17. Transform the following sentence in Reported Speech into Direct Speech, paying attention to the punctuation marks used:

The Reserve Bank announced that since that day was a National Holiday, it had no fresh directions for the customers.
A. The Reserve Bank had announced, "Since today was a National Holiday, we had no fresh directions for the customers."
B. The Reserve Bank announces, "Since today is a National Holiday, there are no fresh directions for the customers."
C. The Reserve Bank announced, "Since today is a National Holiday, we have no fresh directions for the customers."
D. The Reserve Bank announced, "Today is a National Holiday. No fresh directions for the customers."

18. Fill in the blank by choosing the best option: .... information consumers is rather obvious: it consumes the attention of its recipients.
A. When
B. Which
C. What
D. How

19. Choose the correct preposition from the options given against each and complete the text:

More likely is that they have never before had the mechanism .... revealing it.
A. for
B. at
C. in
D. by

20. Which of these adverbs is the most suitable to complete the sentence:

She sang that song very ....
A. silently   B. long
C. well   D. good

21. Choose the word which is closest in meaning to the underlined word:

In the <u>world</u> of Madagascan sapphire mining, there are few rules.
A. Society   B. Culture
C. Place   D. Environment

22. Choose the antonym or the word which is of contrary meaning to the underlined words:

Reality can <u>conceal</u> truths and thus may not be visible.
A. Declare   B. Confuse
C. Reveal   D. Open

23. Choose the correct preposition from the options given against each and complete the text:

How you cooperate on video game tasks indicates how you will cope .... real-life challenges.
A. on   B. by
C. in   D. with

24. Transform the sentence in passive voice into a sentence in active voice; pay attention to the agent used:

He was charged with lying under oath and murder by the police but was acquitted by the court.
A. The police charged him for lying under oath and murder but the court acquitted him.
B. The police charged him with lying under oath and murder but was acquitted.
C. The police charged him with lying under oath and murder but the court acquitted him.
D. The police charged him with lying under oath and murder but the court acquitted he.

25. Fill in the blank by choosing the best option:
Where should the line between humans and cyborgs be .... ?
A. drawn   B. drew
C. drawing   D. draw

26. Which sentence has the adverb in the correct position?
A. They definitely are suited for each other.
B. They are suited for each other definitely.
C. They are suited for definitely each other.
D. They are definitely suited for each other.

27. Transform the sentence in active voice into a sentence in passive voice; decide if the agent is to be retained or not:
The players, after winning the match, gave their views and comments to the anchor.
A. The anchor was to be given their views and comments by the players, after the match was won.
B. The anchor gave their views and comments by the players, after having won the match.
C. The anchor was given their views and comments by the players, after having won the match.
D. The anchor has been given their views and comments by the players, after having won the match.

28. Fill in the blank by choosing the best option:
In Rome, the fountains in St Peter's Square .... overnight and dripped icicles instead.
A. frozing   B. froze
C. frozen   D. freezed

29. Fill in the blank by choosing the best option:
His gesture .... to the forefront long simmering questions about prejudice and persecution in society.
A. brought   B. bring
C. brung   D. bringed

30. Transform the following sentence in Reported Speech into Direct Speech, paying attention to the punctuation marks used:

When his wife told him that she managed to get some money from the ATM next door, the husband replied that even the machine was afraid of her.
A. When the husband replied, "Even the machine was afraid of her," the wife had already told the husband, "I manage get some money from the ATM next door."
B. Wife to husband: "I managed to get some money from the ATM next door." Husband to wife: "Even the machine is afraid of you."
C. Wife told the husband, "I manage to get some money from the ATM next door." Husband replied, "Even the machine was afraid of her."
D. "I managed to get some money from the ATM next door." "Even the machine is afraid of you."

31. Transform the sentence in passive voice into a sentence in active voice; pay attention to the agent used:

The long wall was given a fresh coat of white paint by the ruling party, anticipating elections.
A. The ruling party, anticipating elections, has given the long wall a fresh coat of white paint.

B. The ruling party, anticipating elections, gives the long wall a fresh coat of white paint.

C. The ruling party gave the long wall, anticipating elections, a fresh coat of white paint.

D. The ruling party, anticipating elections, gave the long wall a fresh coat of white paint.

32. Transform the sentence in passive voice into a sentence in active voice; pay attention to the agent used:

All the decisions of the officials were reviewed by the ministers concerned.

A. The ministers concerned reviewed all the decisions of the officials.

B. The ministers concerned have reviewed all the decisions of the officials.

C. The ministers concerned will review all the decisions of the officials.

D. The ministers concerned review all the decisions of the officials.

33. Which of these adverbs is the most suitable to complete the sentence:

.... we went dancing.

A. Last night   B. Next night

C. Tonight   D. Nights

34. Fill in the blank by choosing the best option:

The wealth of information .... a shortage of something else.

A. exists   B. includes

C. means   D. reads

35. Choose the antonym or the word which is of contrary meaning to the underlined words:

The challenge now is to go to the next stage.

A. First   B. Later

C. Original   D. Previous

36. Transform the following sentence in Reported Speech into Direct Speech, paying attention to the punctuation marks used:

He says that lowering of interest rates would have a great impact on the housing sector.

A. He tells, "Lowering of interest rates will have a great impact on the housing sector."

B. "Lowering of interest rates should have a great impact on the housing sector," is what he is saying.

C. He says, "Lowering of interest rates will have a great impact on the housing sector."

D. He highlights, "Lowering of interest rates has a great impact on the housing sector."

37. Which sentence has the adverb in the correct position?

A. She quite often invites people for Diwali.

B. Often she quite invites people for Diwali.

C. She often quite invites people for Diwali.

D. She quite invites people for Diwali often.

38. Choose the correct preposition from the options given against each and complete the text:

Who polices the truth .... the internet?

A. at   B. in

C. on   D. of

39. Which of these adverbs is the most suitable to complete the sentence:

A. The methodical Customs officer checked all the bags.

B. The Customs officer methodically checked all the bags.

C. Methodically the Customs officer checked all the bags.

D. The Customs officer checked methodically all the bags.

40. Choose the correct preposition from the options given against each and complete the text:

Only a thread .... 20 kilometres (12.4 miles) of ice is keeping a 5,000 square kilometre piece from breaking away.

A. in

B. at

C. by

D. of