TSSPDCL Assistant Engineer- Electrical 2015 Question Paper

1. In a single phase R-L series circuit, if current lags the supply voltage by an angle Φ, then the voltage across inductor _____ the supply voltage by an angle of _____ :

   (A) lags … (90 – ϕ) (B) lags … ϕ (C) leads … (90 – ϕ) (D) leads … ϕ

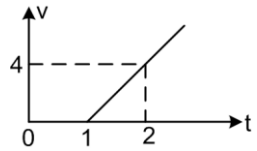
2. Four parallel resistors connected in parallel with five series resistors are connected to a DC supply of 210 V. If 'R' is resistance of each resistor and current is 5 A, then the value of 'R' is :

   (A) 42 Ω (B) 441 / 25 Ω (C) 10 Ω (D) 882 / 5 Ω

3. An inductor of Q factor 10 is connected in series with a capacitor having a Q factor of 100. The overall Q factor of the circuit is :

   (A) 100 / 11 (B) 11 (C) 110 (D) 1000

4. Find the Laplace transform of the function shown in the following figure :



   (A) $\frac{4}{s^2}e^{-s}$ (B) $\frac{4}{s}e^{-s^2}$ (C) $\frac{1}{s^2}e^{-s^4}$ (D) $\frac{1}{s^4}e^{-s^2}$

5. A 3-Φ , 400 V , balanced star connected load takes a current of 2.5 A and the power is measured by two wattmeters. If lower value of two positive readings is 707 W, what is the value of power factor?

   (A) cos (π/4) (B) cos (π/6) (C) cos (π/8) (D) cos (π.12)

6. Regarding resonance of a two-branch parallel circuit having R-L combination in one branch and C in the branch, which of the following statements are false?

(a) impedance is maximum and current is minimum

(b) impedance is minimum and current is maximum

(c) two branch currents are exactly 180° with each other

(d) resonant frequency $f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$

(A) b and c (B) c and d (C) d and a (D) a and b

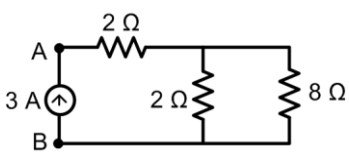
7. A 1-ϕ circuit with a supply voltage 'V' consists of resistance 'R' and reactance 'X' in series. The locus of current is a circle with a radius of _____ when 'R' is varied.

(A) V / X (B) V / 2X (C) V / πX (D) V / 2πX

8. An RMS voltage of 35 V is applied across a 1-ϕ R-C series circuit. If the RMS voltage across the capacitor is 28 V, then the angle between current and supply voltage is :

(A) $\sin^{-1}(0.60)$ (B) $\cos^{-1}(0.80)$ (C) $\tan^{-1}(0.75)$ (D) $\cot^{-1}(0.75)$

9. What is voltage V_{AB} across the current source in the following figure?



(A) 8 / 3 V (B) 36 V (C) 54 / 5 V (D) 27 V

10. Choose the instantaneous power of a pure capacitive 1-ϕ AC circuit, if V_m, I_m and f are peak voltage, peak current and frequency of sinusoidal supply.

(A) $0.5V_mI_m\sin 4\pi ft$ (B) $-0.5V_mI_m\sin 2\pi ft$

(C) $-0.5V_mI_m\sin 4Vft$ (D) $0.5V_mI_m\sin 2\pi ft$

11. In a second order Type 1 system for continuous oscillations, the time response is proportional to : (f_n is natural frequency of oscillations)

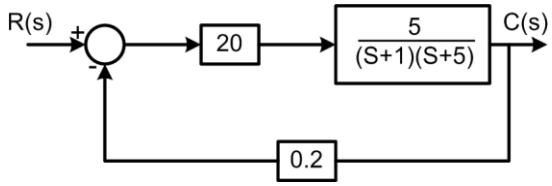
(A) 1-cos(4 $\pi f_n t$) (B) 1-cos(2 $\pi f_n t$) (C) 1-sin(2 $\pi f_n t$) (D) 1-sin(4 $\pi f_n t$)

12. A differentiator is not usually used in control system, because it :

(A) reduces damping (B) increases error

(C) reduces gain margin (D) increases input noise

13. Find the damped frequency of oscillations of the following system :



(A) 4 cycles/sec (B) 2/π rad/sec (C) 4 ra /sec (D) 4/π cycles/sec

14. A series R-L-C circuit has, inductance L=2 mH, resistance R=1 kΩ and capacitance C=5 μF. Determine the type of damping, if C is decreased 1000 times its previous value

(A) over damping (B) undamping (C) under damping (D) critical damping

15. The third order polynomial system P(s) = $a_1 s^3 + a_2 s^2 + a_3 s + a_0$ is stable, if :

(A) $a_2 a_0 > a_1 a_3$ (B) $a_2 a_3 < a_0 a_1$ (C) $a_2 a_0 < a_1 a_3$ (D) $a_2 a_3 > a_0 a_1$

16. The state-space model $\begin{matrix} \dot{x}(t) = A(t)\dot{x}(t) + B(t)u(t) \\ y(t) = C(t)x(t) + D(t)u(t) \end{matrix}$ represents _____ system.

(A) Discrete time-variant (B) Continuous time-invariant

(C) Continuous time-variant (D) Discrete time-variant

17. For measurement of radio frequency AC signals _____ type meter is used.

(A) thermo-couple (B) electro-static (C) electro-dynamometer (D) rectifier

18. Creep occurs in 1-ϕ energy meters when _____ is energized and it is mainly because of _____ for friction.

(A) current-coil … over-compensation (B) pressure-coil … over-compensation

(C) pressure-coil … under-compensation (D) current-coil … under-compensation

19. In Maxwell's inductance-capacitance bridge a resistance is in _____ with standard capacitor and in Hay's bridge a resistance is in _____ with a standard capacitor

(A) series … parallel (B) series … series

(C) parallel … parallel (D) parallel … series

20. In Lissajous pattern on the screen of a CRO is an ellipse with major axis in quadrant 2 and quadrant 4. Then the phase difference between two signals can be :

(A) 270° (B) 210° (C) 180° (D) 300°

21. In CRO, during retrace time the electron beam travel _____ from _____ of the screen.

(A) diagonally … top left to bottom right (B) vertically … top to bottom

(C) horizontally … right to left (D) vertically … bottom to top

22. If Poisson's ratio of a resistance wire strain gauge is 1.8, then neglecting piezo-resistive effects, its Gauge factor is :

(A) 2.8 (B) 2.6 (C) 4.6 (D) 3.6

23. When diameter and thickness of diaphragm of a pressure sensing unit are doubled, then its natural frequency will

(A) be doubled (B) remains same (C) be quadrupled (D) be halved

24. Choose an incorrect choice from the following. As load torque decreases, speed of _____ motor decreases.

(A) DC series (B) DC shunt

(C) DC cumulative coupled (D) DC differential coupled

25. In torque (T)-slip (s) characteristic of 3- ϕ squirrel cage induction motor, at maximum torque :

(A) dT/ds is maximum (B) dT/ds is zero (C) ds/dT is zero (D) slip is maximum

26. In a 3-phase alternator, if there is only magnetizing armature reaction, the load is

(A) capacitive (B) inductive (C) resistive (D) inductive and resistive

27. The potier triangle is always a/an _____ triangle in the measurement of voltage regulation of 3-ϕ alternator using _____ method

(A) equilateral … ZPF (B) isoscleles … ZPF (C) right angle … ZPF (D) obtuse … MMF

28. The eddy current loss in a DC generator is 400 W at 40 Hz frequency of reversal and constant flux density. When frequency is increased to 50 Hz, eddy current loss is :

(A) 265 W (B) 320 W (C) 500 W (D) 625 W

29. Identify the increasing order of voltage regulation of the following DC generators at same load :

(A) differential compound, shunt and under compound

(B) shunt, differential compound and under compound

(C) under compound, shunt and differential compound

(D) shunt, under compound and differential compound

30. If ϕ_m is peak value of flux, then the magnitudes of rotating magnetic field for 2-phase supply and 3-phase supply are :

(A) ϕ_m and $1.5 \times \phi_m$ respectively (B) ϕ_m and $\sqrt{3} \times \phi_m$ respectively

(C) $\sqrt{2} \times \phi_m$ and $1.5 \times \phi_m$ respectively (D) $\sqrt{2} \times \phi_m$ and $\sqrt{3} \times \phi_m$ respectively

31. The phase difference between any two successive third harmonic in 3-ϕ transformer is :

(A) zero radius (B) $\frac{\pi}{2}$ radians (C) $\frac{\pi}{3}$ radians (D) $\frac{2\pi}{3}$ radians

32. At full-load of a transformer, the iron loss and copper loss are 3000W and 4000W respectively. Then total loss at maximum efficiency is :

(A) 7000 W (B) 6000 W (C) 8000 W (D) 4000 W

33. Two 3-ϕ transformer cannot be operated in parallel, if their :

(A) kVAs are different (B) phase sequence are different

(C) % impedances are different (D) voltage ratios are different

34. A transformer operates 24 hours day at full-load. It's full-load efficiency is :

(A) equal all day efficiency (B) more than all-day efficiency

(C) less than all-day efficiency (D) equal to maximum efficiency

35. If per phase rotor resistance and reactance of a 3-Φ slip ring induction motor at standstill are 0.02 Ω and 0.2 Ω respectively then to obtain maximum starting torque, the external resistance to be connected in each phase of rotor is :

(A) 0.22 Ω (B) 0.18 Ω (C) 100 Ω (D) 0.20 Ω

36. The number of poles of 8/6 stepper motor can be :

(A) 3 (B) 4 (C) 6 (D) 7

37. The input and efficiency of a 3-ϕ, 50 Hz, 1350 rpm, 4 pole induction motor is 9 kW and 80% respectively. Calculate its stator losses.

(A) 900 W (B) 1.80 kW (C) 1 kW (D) 1.75 kW

38. At a given load torque :

(A) Speed of 1-ϕ AC series motor = speed of DC series motor

(B) Speed of 1-ϕ AC series motor > speed of DC series motor

(C) power output of 1-ϕ AC series motor > power output of DC series motor

(D) Speed of AC series motor < speed of DC series motor

39. If two line currents of a 3-ϕ system are (500+j150) A and (-300+j600) A and its zero sequence component is (100+j50) A , then the line current in the other phase is :

(A) (0.1-j0.6) kA (B) (100-j500) A (C) (0.1+j0.6) kA (D) (100+j500) A

40. In the operating region ($\delta < 70^{O}$), the synchronizing power coefficient is (where δ is load angle) :

(A) larger in a round rotor machine than in a salient pole machine

(B) same in both salient pole and round rotor machines

(C) larger in a salient pole machine than in a round rotor machine

(D) zero in both salient pole and round rotor machines

41. In tuned power lines, on load :

(A) the receiving end voltage is numerically equal to the sending end voltage

(B) the receiving end current is numerically equal to the sending end current

(C) there is no voltage drop

(D) all the above

42. The unit heat rate characteristic of a thermal power unit shows :

(A) heat input per kWh of output verses the megawatt output of unit

(B) heat input per kW of output versus the megawatt output of unit

(C) heat input per kWh of output versus the megawatt hour output of unit

(D) heat input per kW of output versus the megawatt hour output of unit

43. The power factor of dielectric

(A) is a function of temperature of the dielectric only

(B) depends only on voltage stress to which the dielectric is stressed

(C) always constant

(D) both (A) and (B)

44. A minimum clearance of 6.3 m to ground is required for overhead lines when operating voltages are :

(A) less than 66 kV (B) lie between 66 kV and 110 kV

(C) more than 165 kV (D) lie between 110 kV and 165 kV

45. A synchronous generator is solidly grounded through neutral reactance X_n. If X_1, X_2 and X_0 are +ve , -ve and zero sequence reactances respectively and LG-fault current is more than 3-phase fault current, when :

(A) $X_0 >> X_1 = X_2$ (B) $X_0 = X_1 = X_2$ (C) $X_0 << X_1 = X_2$ (D) $X_2 << X_0 = X_1$

46. Generally in a power system network, the load is represented as a :

(A) constant power in both load flow study and in stability study

(B) constant power in load flow study and constant impedance in stability study

(C) constant power in stability study and constant impedance in load flow study

(D) constant impedance in both load flow study and in stability study

47. The respective 'B' parameters ratio and 'C' parameters ratio of nominal π model and nominal T model of medium transmission line are :

(A) $\left(\frac{YZ}{4}+1\right), \left(\frac{YZ}{4}+1\right)$

(B) $\left(\frac{YZ}{4}+4\right), \left(\frac{4}{YZ+4}\right)$

(C) $\frac{1}{\frac{YZ}{4}+1}, \frac{1}{\frac{YZ}{4}+1}$ (D) $\left(\frac{4}{YZ+4}\right), \left(\frac{YZ+4}{4}\right)$

48. For selecting a circuit breaker, _____ should be determined:

(A) initial current that flows on occurrence of a short circuit only

(B) transient current that flows at the time of circuit interruption only

(C) resonant frequency only

(D) (A) and (B)

49. A 60 Hz, 4-pole turbo generator rated 100 MVA, 11 kV has an inertia constant of 8 MJ/MVA. If mechanical input is suddenly raised to 80 MW for an electrical load of 60 MW, then its rotor acceleration is (neglect mechanical and electrical losses) :

(A) 270 elec.deg / s^2 (B) 337.5 elec.deg / s^2

(C) 225 elec.deg/s^2 (D) 810.0 elec. Deg/s^2

50. The ratio of full-load volt-amperes to short-circuit volt-amperes is equal to :

(A) short circuit MVA/Base MVA (B) Z (p.u)

(C) V (p.u) (D) Short circuit current (p.u)

51. Choose the wrong statement from the following:

(A) The impedance relay is less effected from synchronizing power surges as compared to reactance relay

(B) The impedance relay is less effected from arc resistance as compared with the Mho relay

(C) The impedance relay is more effected from synchronizing power surges as compared to reactance relay

(D) The impedance relay is used for protecting medium length transmission lines

52. In case of cover voltage protection scheme :

(A) Use of ground wire is shielding method whereas the use of spark gaps & lighting arrestors are non-shielding methods

(B) Use of ground wire is non-shielding method whereas the use of spark gaps & lightning arrestors are shielding methods

(C) Use of ground wire and spark gaps are shielding methods whereas the use of lightning arrestors are non-shielding methods

(D) Use of ground wire and lightning arrestors are shielding methods whereas the use of sharp gaps are non-shielding methods

53. IDMT relays are used to protect the transformer against :

(A) Internal short circuits (B) Open circuits (C) External short circuits (D) Oil leakage

54. Resistance grounding is normally used for :

(A) high voltage long over head transmission lines

(B) low voltage short head transmission lines

(C) extra high voltage long over head transmission lines

(D) all the above

55. The diagonal element of a nodal admittance matrix are strengthened by adding :

(A) Shunt capacitors (B) Shunt inductances (C) Generators (D) Resistive loads

56. Calculate the collector current of a silicon BJT, when DC current gain, base current and reverse saturation current of collector-base junction are 100, 20 μA and 500 nA respectively

(A) 2.051 mA (B) 2 mA (C) 1.949 mA (D) 0.051 mA

57. Which of the following gates can be used to realize all possible combinational logic functions?

(i) OR gate (ii) NOT gate (iii) XOR gate (iv) NAND gate (v) AND gate

(A) (iii), (iv) and (v) (B) (i), (iii) and (iv) (C) (ii) and (iv) (D) (i) and (v)

58. The AC bypassing of R_F by C_F in a common emitter configuration :

(A) increase AC signal across emitter-base junction

(B) decrease AC signal across emitter-base junction

(C) decrease voltage amplification

(D) stabilizes the Q-point

59. A current controlled voltage source is equivalent to :

(A) series voltage feed-back amplifier (B) shunt current feed-back amplifier

(C) shunt voltage feed-back amplifier (D) series current feed-back amplifier

60. An astable multi-vibrator has

(A) two-quasi stable states (B) one-quasi stable states

(C) two stable states (D) no stable states

61. Choose an incorrect statement from the following regarding pin numbers of 8085 μP

(A) serial I/O ports are 5 and 4 respectively

(B) reset out and CLK out are 3 and 37 respectively

(C) GND and V_{CC} are 20 and 40 pins respectively

(D) RST 6.5 and RST 7.5 are 7 and 8 respectively

62. A separately excited DC motor operating in first quadrant is fed from 3-Φ semi-converter. If free-wheeling diode is open circuited, then the motor :

(A) can be operated in first quadrant (B) can be operated in first & second quadrants

(C) can be operated in first & fourth quadrants (D) cannot be operated

63. Speed of 3-Φ, 2-pole, 60 Hz. Synchronous motor is controlled by a step-down 3-Φ cyclo-converter. The maximum speed of the motor can be :

(A) 1200 rpm (B) 3000 rpm (C) 1000 rpm (D) 3600 rpm

64. If the time period of output voltage of a 1-ϕ bridge rectifier is 25/3 ms, then the supply frequency is :

(A) 30 Hz (B) 50 Hz (C) 25 Hz (D) 60 Hz

65. The input current of a 3-ϕ AC voltage controller is found to be sinusoidal. Then the type of load is _____ and firing angle (radians) is

(A) capacitive … zero (B) capacitive … π/2 (C) inductive …π (D) resistive … 2π

66. Basically brushless DC motor is _____ and its torque speed characteristics are similar to _____

(A) a DC motor … asynchronous motor (B) a synchronous motor … DC motor

(C) an asynchronous motor … DC motor (D) a DC motor … synchronous motor

67. To get maximum harmonic distortion in the output, a 3-ϕ cyclo-converter requires :

(A) 12 SCRs (B) 18 SCRs (C) 36 SCRs (D) 72 SCRs

68. In constant flux control of 3-ϕ synchronous motor, at medium and rated frequencies the supply voltage 'V' and supply frequency 'f; are related as : V = kf, where 'k' is a constant. But at very low frequencies, the supply voltage should be :

(A) greater than kf (B) equal to $kf^{1/6}$ (C) less than kf (D) equal to $k\sqrt{f}$

69. If active input power of a 1-ϕ semi-converter with R-L load is 200 W at a firing angle of π/3, then neglecting harmonic component of output current calculate the reactive input power

(A) $100\sqrt{3}$ (B) $200\sqrt{3}$ (C) $100/\sqrt{3}$ (D) $200/\sqrt{3}$

70. A 3-ϕ voltage source inverter operates in 180° conduction mode with a star connected resistive load. If input DC votage is 100 V then the peak to peak output line voltage is ;

(A) 200/3 V (B) 200 V (C) 400/3 V (D) $200 \times \sqrt{3}$ V

71. The input voltage of a 1-Φ full wave AC voltage controller is V=282.8 sin(314t). If the load is resistive and output voltages is 162 V, then the input power factor is :

(A) 0.573 (B) 0.900 (C) 0.810 (D) 0.656

72. In quadrilateral speed-time curve of electric traction system, the accelerations during successive time periods are _____ respectively

(A) positive, negative and negative (B) positive, zero and negative

(C) positive, positive and negative (D) positive, negative and zero

73. In an arc furnace maximum power input occurs at when the practical power factor of the primary is :

(A) 0.75 < pf < 0.80 (B) pf = 0.707 (C) 0.707 < pf < 0.75 (D) 0.80 < pf < 0.85

74. Identify the correct combination of respective electric arc welding and electric resistance welding methods ;

(A) Butt welding and seam welding

(B) hydrogen shielding and projection welding

(C) seam welding and coated electrode welding

(D) coated electrode welding and hydrogen shielding

75. If a plane angle subtended at a point is π/3 radians, then the solid angle subtended at the same point is :

(A) $\frac{\pi(2-\sqrt{3})}{2}$ (B) $\frac{\pi(2+\sqrt{3})}{2}$ (C) $\pi(2-\sqrt{3})$ (D) $\pi(2+$

3

76. Choose the correct order of electric discharge lamps in their increasing order of efficiencies (lumens/watt) :

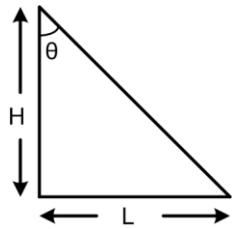
(A) sodium vapour lamp, mercury vapour lamp, neon lamp

(B) neon lamp , mercury vapour lamp, sodium vapour lamp

(C) neon lamp, mercury vapour lamp, sodium vapour lamp

(D) mercury vapou lamp, sodium vapor lamp, neon lamp

77. To get maximum illumination at a fixed horizontal distance ‘L’ of 10 m, at what vertical height ‘H’ a lamp can be erected?



(A) 7.07 m (B) 5.77 m (C) 5.00 m (D) 3.33m

78. Theft electricity is dealt in _____ of Indian electricity rules

(A) section 134 (B) section 135 (C) section 136 (D) section 137

79. If ‘D’ is diameter of circular area ‘A’ swept by rotor and ‘V’ is wind speed, the wind power is proportional to :

(A) AV^2 (B) A^2V^3 (C) D^2V^3 (D) D^3V^2

80. A solar pond is a combination of :

(A) Solar energy storage and heal collection

(B) Solar energy collection and heat storage

(C) Solar energy collection and energy storage

(D) All the above

81. In the following question, choose the word that is opposite in meaning to the given word.

CAPACIOUS :

(A) Changeable (B) Foolish (C) Caring (D) Limited

82. Identify the part of the sentence that has an error :

<u>In spite the/doctor’s stern warning/he continued taking/sugar in tea</u>

(A) (B) (C) (D)

83. Choose the appropriate option to complete the following sentence :

One of the time-tested ways of remembering a series of items is known as a _____ device :

(A) Intellectual (B) Mnemonic (C) schematic (D) ingenious

84. Identify the misspelt word from the given words :

(A) Margarine (B) Marvellous (C) Melifluence (D) Marionette

85. What is the full form of ICRISAT? :

(A) International Crafts Research Institute for the Semi-Arid Tropics

(B) International Crops Research Institute for the Semi-Arid Tropics

(C) Indian Crops Research Institute for the Semi-Arid Tropics

(D) International Crops Related Institute for the Semi-Arid Tropics

86. Which of the following countries does not have a boundary with India? :

(A) Myanmar (B) Bhutan (C) Mauritius (D) Nepal

87. Which of the following awards is given by the Ministry of Youth Affairs and Sports, Government of India, for excellence in sports coaching? :

(A) Dronacharya award (B) Rajiv Gandhi Khel Ratna award

(C) Arjuna award (D) C.K. Naidu award

88. Which of the following is also known as laughing gas ? :

(A) Nitrogen dioxide (B) Nitrogen trioxide

(C) Nitrogen tetraoxide (D) Nitrous oxide

89. The ‘Gentlemen’s Agreement’ was signed between Telangana and Andhra leaders in the year ____ :

(A) 1953 (B) 1956 (C) 1948 (D) 1969

90. Who was the last nizam ruler of the erstwhile Hyderabad state? :

(A) Mir Nizam Ali Khan (B) Mir Akbar Ali Khan

(C) Mir Mahbub Ali Khan (D) Mir Osman Ali Khan

91. The Razakars resisted the :

(A) integration of Hyderabad state into the United Andhra Pradesh

(B) integration of Hyderabad state into the then Telangana region

(C) integration of Hyderabad state into the dominion of India

(D) integration of Hyderabad state into the then Andhra region

92. Boddemma festival indicates the ending of _____ :

(A) Varsha rutu (B) Greeshma rutu (C) Sharad rutu (D) Vasantha rutu

93. Windows explorer is a program used to :

(A) Browse the internet

(B) Navigate the files or folders in windows operating system

(C) Discover the number of windows running in PC

(D) Calculate how many application is running

94. What will be the Octal equivalent of $(22abc)_{16}$:

(A) 445274 (B) 452274 (C) 452724 (D) 425274

95. The difference between people with access to computers and the internet and those without this access is known as :

(A) Digital divide (B) Internet divide (C) Web divide (D) Cyber way divide

96. Personal computer use a number of chips mounted on a main circuit board. What is the common name for such boards?

(A) Main board (B) Motherboard (C) Dash board (D) Breadboard

97. A shopkeeper buys an item for 4,913. He offers 15% discount on selling price of item and yet gains 20%. Find the rate at which he marked the article.

(A) ` 5,965 (B) ` 6,936 (C) ` 6,136 (D) ` 5,158

98. The curved surface area of a cylindrical pillar is 176 m^2 and its volume is 616 m^3. Find the ratio of its diameter to its height

(A) 7:2 (B) 7:3 (C) 3:7 (D) 2:11

99. If one side of a square is doubled in length and the adjacent side is decreased by four centimeters, then the area of the resulting rectangle is 48 square centimeters larger than that of the original square. Find the length and width of the rectangle

(A) 12cm ; 8 cm (B) 11 cm, 9 cm (C) 24 cm; 8 cm (D) 24 cm, 12 cm

100. If $10^y=0.0001$, $3^{4x}=81^{-1}$, then the value of $2^{-x}16^{1/y}=$

(A) 2 (B) 3 (C) 10 (D) 1