Kerala PSC

Previous Year Paper

Polytechnic Lecturer (Electrical and Electronic Engineering) 2016

167/2016

Maximum : 100 marks

Time : 1 hour and 15 minutes

1. Which one of the following town is not located on a river bank?
   (A) Agra (B) Patna
   (C) Bhopal (D) Kolkata

2. 'Meghalaya' is the name given to the region corresponding to :
   (A) Siachin mountain ranges (B) Garo-Khasi hill region
   (C) Nagaland region (D) Satapura mountain region

3. UNDP has declared 11th July as the World Population Day since 1989 because the World Population reached :
   (A) 500 crore (B) 700 crore
   (C) 740 crore (D) 750 crore

4. Who is the Vice Chairman of NITI Aayog?
   (A) Ramesh Chand (B) Raghuram Rajan
   (C) Arundathi Bhattacharya (D) Aravind Panagaria

5. Name the National leader who put forward the 'Drain Theory'.
   (A) Dadabhai Naoroji (B) S.N. Banerji
   (C) R.C. Dutt (D) Motilal Nehru

6. Who was the President of Indian National Congress when congress signed merger pact with Muslim League in 1916?
   (A) S.P. Sinha (B) Mrs. Annie Besant
   (C) Bhupendranath Bose (D) A.C. Majumdar

7. In which session, Subhash Chandra Bose elected as the President of Indian National Congress in first time :
   (A) Lucknow (B) Tripuri
   (C) Haripura (D) Lahore

8. The first great experiment in Satyagraha was launched by Mahatma Gandhi at :
   (A) Dandi (B) Ahmedabad
   (C) Bardoli (D) Champaran

9. In which place we can see Paradesi Sinagogue?
   (A) Kanyakumari (B) Mananthavadi
   (C) Mattancherry (D) Thrissur

10. The first Mamankam festival was conducted at :
   (A) Varkkala (B) Thirunnavaya
   (C) Kodungallur (D) Thiruvananthapuram

11. Which social reformer started the Journal Abhinava Kerala in 1921?
(A) Sivananda Yogi (B) Sri Narayana Guru
(C) Ayyankali (D) Vagbhatananda

12. Kochi Raja conferred the title 'Kavithilakan' to an eminent social reformer of Kerala was :
(A) Pandit Karuppan (B) Sahodaran Ayyappan
(C) Poyikayil Yohannan (D) Mannath Padmanabhan

13. Adukkalayil Ninnu Arangathekku the play written by :
(A) Vagbhatananda (B) V.T. Bhattathiripad
(C) K.P. Kesava Menon (D) Brahmananda Shiva Yogi

14. Who started the newspaper Swadeshabhimani?
(A) K. Ramakrishna Pillai (B) K.P. Kesava Menon
(C) Vakkam Abdul Khader Moulavi (D) Kandathil Varghese Mappila

15. Who formed the Ezhava Maha Sabha?
(A) Sri Narayana Guru (B) Kumaran Asan
(C) Sahodaran Ayyappan (D) Dr. Palpu

16. Who is newly elected Prime Minister of Nepal?
(A) K.P. Sharma Oli (B) Pushpa Kamal Dahal
(C) Sher Bahadur Deuba (D) Bidhya Devi Bhandari

17. 'Patidar agitation'. demanding reservation in Government Jobs and Educational Institutions started in the State of :
(A) Rajasthan (B) Maharashtra
(C) Gujarat (D) Andhra Pradesh

18. Who is the Marathone runner lights the Olympic Cauldron of Rio 2016?
(A) Michel Temer (B) Dilma Rousseff
(C) Paulinho da Viola (D) Wanderle de Lima

19. "Gods in Shackle's a documentary on the plight of elephants, directed by?
(A) Sangita Iyer (B) Akeeran Kalidasan Bhattathiripad
(C) Superna Ganguly (D) Dr. Raman Sukumaran

20. Who is the Present Chairman of Kerala State Film Academy?
(A) Kamal (B) Fasil
(C) Ranjith (D) KPAC. Lalitha

21. If P is a square matrix, then $P - P^T$ is always :
(A) Symmetric (B) Skew Symmetric
(C) Singular (D) Non Singular

22. Inverse of the matrix $\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$ is :

(A) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} \frac{1}{2} & \frac{-1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$

(D) $\begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{-1}{2} & \frac{1}{2} \end{bmatrix}$

23. The term containing x^8 in the expansion of $\left(2x - \frac{1}{2x}\right)^{20}$ is the :

(A) 12^{th} term

(B) 8^{th} term

(C) 7^{th} term

(D) 6^{th} term

24. The value of $\sec(-240^\circ)$ is :

(A) -2

(B) 2

(C) $\frac{-\sqrt{3}}{2}$

(D) $\frac{\sqrt{3}}{2}$

25. If $P = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then $P^3 =$

(A) $\begin{bmatrix} \cos^3\theta & \sin^3\theta \\ -\sin^3\theta & \cos^3\theta \end{bmatrix}$

(B) $\begin{bmatrix} \cos\theta & \sin 3\theta \\ -\sin 3\theta & \cos\theta \end{bmatrix}$

(C) $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

(D) $\begin{bmatrix} \cos 3\theta & \sin 3\theta \\ -\sin 3\theta & \cos 3\theta \end{bmatrix}$

26. Area of the region in the first quadrant bounded by the x - axis, the circle $x^2 + y^2 = 4$ and the chord of this circle which makes an angle 45° with the positive direction of x - axis is

(A) $\frac{\pi}{2}$ sq. units

(B) π sq. units

(C) 2π sq. units

(D) $\sqrt{2\pi}$ sq. units

27. The value of $\lim_{x \to 2/3} \frac{27x^3 - 8}{27x - 18}$ is :

(A) Not defined

(B) $\frac{8}{27}$

(C) $\frac{4}{3}$

(D) $\frac{8}{9}$

28. The maximum value of $\sin x + \cos x$ is :

(A) 2

(B) 1

(C) $\sqrt{2}$

(D) $\frac{1}{\sqrt{2}}$

29. The value of the definite integral $\int_1^{e^{\sqrt{2}}} \frac{(\log x)^3}{x} dx$ is :

(A) 6 (B) 1

(C) $\frac{1}{2}$ (D) $\frac{e^2}{4}$

30. General solution of the differential equation $\tan x \frac{dy}{dx} + y = \text{cosec} x \tan x$ is :

(A) $y \sin x = x + C$ (B) $y \text{cosec } x + \cot x = C$

(C) $y \cos x = x + C$ (D) $y + \cos x = C$

31. The main constituent of a Portland Cement is :

(A) Lime (B) Alumina

(C) Iron Oxide (D) Magnesium Oxide

32. Type of concrete mix used in R.C.C. Work (Buildings) :

(A) M_{10} (B) M_{15}

(C) M_{20} (D) M_{200}

33. When the water table is close to the ground surface, the bearing capacity of a soil is reduced to :

(A) Three – fourth (B) One - half

(C) Two – third (D) One - fourth

34. A staff reading taken on a bench mark or a paint of known elevation is called :

(A) Intermediate sight (B) Back sight reading

(C) Fore sight reading (D) Line of collimation

35. The power of a telescope to form distinguishable images of objects separated by small angular distance is called its :

(A) Resolving power (B) Brightness

(C) Sensitivity (D) Definition

36. What type of cooling system is generally employed in two stroke engines used in two wheelers?

(A) Water cooling (B) Air cooling

(C) Oil cooling (D) All of the above

37. The compression ratio of a diesel engine is in the range from :

(A) 9-11 (B) 1-5

(C) 15-24 (D) None of these

38. The function of a flywheel in an automobile is to :

(A) Convert reciprocating motion to rotary motion

(B) Transfer the engine torque to gearbox

(C) To store the energy during the working stroke of the engine

(D) All of the above

39. A Kaplan turbine is preferred when the available head is :
(A) Low
(B) Medium
(C) High
(D) None of these

40. In a nuclear reactor, heavy water can be ideally used as :
(A) Biological shield
(B) Moderator
(C) Control rods
(D) All of the above

41. Form factor is equal to :
(A) $\frac{\text{Average value}}{\text{r.m.s. value}}$
(B) $\frac{\text{r.m.s. value}}{\text{Average value}}$
(C) $\frac{\text{r.m.s. value}}{\text{instantanious value}}$
(D) $\frac{\text{Average value}}{\text{instantanious value}}$

42. Value of Power factor lies in between :
(A) 0 and 1
(B) 0 and 10
(C) 10 and 100
(D) 10 and 1000

43. Two resisters R_1 and R_2 give combined resistance of 6 ohm when in series and 0.83 ohm when in parallel. The resistances are :
(A) 3 ohm and 3 ohm
(B) 4 ohm and 2 ohm
(C) 5 ohm and 1 ohm
(D) 4.5 ohm and 1.5 ohm

44. In an R, L, C series circuit impedance Z is equal to :
(A) $\sqrt{R^2+(X_L \sim X_C)^2}$
(B) $\sqrt{R^2-(X_L \sim X_C)^2}$
(C) $\sqrt{R^2+XL^2}$
(D) $\sqrt{R^2+XC^2}$

45. A wire having resistance R_1 is stretched to double its length. The new resistance R_2 is :
(A) R_1
(B) $2R_1$
(C) $4R_1$
(D) $\frac{R_1}{2}$

46. When voltage applied to a diode is more than PIV, it is likely to result in :
(A) More distortion on output side
(B) Poor regulation
(C) Conduction in both direction
(D) Breakdown at the junction

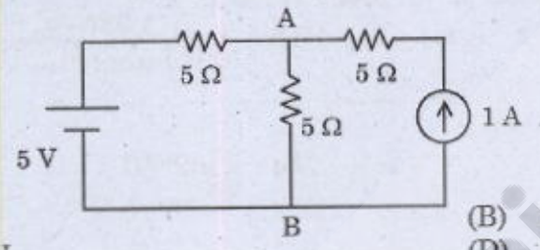
47. Which of these cells in GSM / CDMA networks are used for densely populated areas?
(A) Macro cells
(B) Micro cells
(C) Selective cells
(D) Umbrella cells

48. The one bit registers provided in microcontrollers to store the results of certain program instructions are called a ————————.
(A) Status Register
(B) Program Counter
(C) Flag
(D) DPTR

49. What is the typical drop out voltage across 7805 fixed positive voltage regulator?
(A) 2 V
(B) 1.5 V
(C) 100 mV
(D) 4 mV

50. A cell of an UPS battery has an Ah efficiency of 80%. It has an average terminal voltage on discharge and charge of 1.2 V and 1.6 V respectively. The Watt-hour efficiency of the cell is _____ %.
(A) 50%
(B) 60%
(C) 80%
(D) 100%

51. Find the Thevenin's voltage across the points A and B in the following circuit :



(A) 5 V
(B) 10 V
(C) 15 V
(D) 12.5 V

52. Which of the following currents can induce the maximum induced voltage in a coil?
(A) 1 A, DC
(B) 1 A, 100 Hz
(C) 1 A, 1 Hz
(D) 20 A, DC

53. A bandpass filter has a bandwidth of 4 kHz with a central frequency of 50 kHz. If the gain at 48 kHz is 10 dB, what is the maximum gain?
(A) 13 dB
(B) 7.32 dB
(C) 13.6612 dB
(D) 10 dB

54. In a 3 phase power measurement using two wattmeter method, both wattmeters give the same reading. What is the power factor of the circuit?
(A) 0.5 lag
(B) Unity
(C) 0.5 lead
(D) Zero

55. A spherical capacitor has an inner conducting sphere of 0.1 m and outer conducting sphere of radius 0.2 m. The space in between is filled with a dielectric of permeability ε. What is its capacitance?
(A) $4\pi\varepsilon$
(B) $8\pi\varepsilon_0$
(C) $0.8\pi\varepsilon$
(D) $1.25\pi\varepsilon$

56. Divergence of curl of any vector is :
(A) 0
(B) same vector
(C) null vector
(D) unity vector

57. Two inductances of 1 H each are coupled together. The maximum value of mutual inductance between them is :
(A) 2 H
(B) 0.5 H
(C) 0.25 H
(D) 1 H

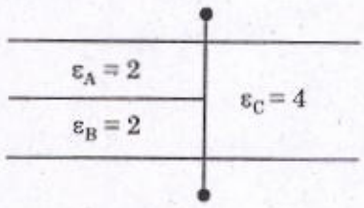
58. The inductance of a long solenoid is measured as 1 mH. What will be its inductance, if the number of turns is doubled?

(A) 1 mH
(B) 4 mH
(C) 0.5 mH
(D) 2 mH

59. The energy stored in the magnetic field of a solenoid carrying a current of 10 A is 0.5 J. What will be the stored energy if the number of turns is doubled and the current is halved?

(A) 1 J
(B) 2 J
(C) 0.5 J
(D) 0.25 J

60. A capacitance is formed using 3 different dielectrics, as shown in the figure. If the capacitance due to dielectric A alone is $2\,\mu F$, what is the total capacitance?



(A) $3\,\mu F$
(B) $8\,\mu F$
(C) $2\,\mu F$
(D) $4\,\mu F$

61. The minimum regulation of a transformer occurs at a power factor of 0.707. The power factor at maximum regulation will be :

(A) 0.806
(B) 0.707
(C) Unity
(D) 0.5

62. The core loss of a transformer under OC test was measured as 40 W using an LPF wattmeter. If the same power is measured using an HPF wattmeter, what will it read :

(A) > 40 W
(B) < 40 W
(C) 40 W
(D) Cannot predict

63. A 220 V DC machine which runs at rated speed as a generator supplies 10 A current. If the same machine is allowed to run as a motor and if it takes 10 A current, at what percentage of rated speed will it run?

(A) 89%
(B) 100%
(C) 102%
(D) 112%

64. In a Brush Less DC (BLDC) motor, the construction of motor is similar to :

(A) Stepper
(B) Universal motor
(C) DC motor
(D) Synchronous motor

65. The load angle of a perfectly compensated DC motor is :

(A) 0°
(B) 90°
(C) 180°
(D) Between 0° and 90°

66. In a v/f controlled induction motor which runs at 50 Hz and rated voltage, the speed was found to be 1440 rpm. If the machine runs at 850 rpm at 30 Hz, what is the slip?
(A) 0.03 (B) 0.06
(C) 0.04 (D) 0.0556

67. The maximum efficiency of an induction motor occurs at 4 kw. What will be the rating of the machine?
(A) 5 kw (B) 4 kw
(C) 3.5 kw (D) 8 kw

68. A field excitation of 20 A in a certain alternator results in an armature current of 400 A in short circuit and a terminal voltage of 2000 V in open circuit. The magnitude of internal voltage drop within the machine at a load current of 200 A is :
(A) 1500 V (B) 2000 V
(C) 1000 V (D) 100 V

69. A synchronous motor is connected to an infinite bus at 1.0 pu voltage and draws 1.0 pu current at unity power factor. The synchronous reactance is 1.0 pu and resistance is negligible. What is the load angle?
(A) 90° (B) 45°
(C) 0° (D) 60°

70. If the field excitation of a salient pole synchronous generator is removed, what will happen to the machine?
(A) Machine will stop
(B) Speed will be halved
(C) Machine will burn
(D) Continue run at the same speed as motor

71. The leakage resistance of a 100 km long cable is $1\,m\Omega$. For a length of 50 km, the resistance will be :
(A) $2\,m\Omega$ (B) $1\,m\Omega$
(C) $4\,m\Omega$ (D) $0.5\,m\Omega$

72. For an induction motor, it was found that the no load and full load currents are almost the same. The reason is :
(A) motor is faulty
(B) ammeter used is faulty
(C) windings may have burnt
(D) it is possible for some machines to have full load and no load currents equal

73. Two power plants P_1 and P_2 are connected by a lossy line with loss coefficients $B_{11} = 0.001$, $B_{22} = 0.0005$, $B_{12} = -0.0001$. What is the power loss for generations $P_1 = 50\,MW$, $P_2 = 100\,MW$?
(A) $2.5\,MW$ (B) $10\,M$
(C) $5\,MW$ (D) $7\,MW$

74. In the case of a single L-N fault of a 3 phase isolated neutral power system, what will be the voltage on healthy phases? The line-to-line voltage is V kV :

(A) 2 V kV
(B) 0 kV
(C) V kV
(D) $\sqrt{3}$ V kV

75. A lossless transmission line having surge impedance loadings of 2000 MW is provided with a distributed series capacitive compensation of 200 MVAR. The SIL of the compensated line will be :

(A) 2000 MW
(B) 1800 MW
(C) 2200 MW
(D) 2010 MW

76. A voltage of $5+\sqrt{5}\sin(314t+30°)+5\sqrt{5}\sin 628t$ was measured with a capacitive coupled rms meter. What will be the reading?

(A) $\sqrt{130}$
(B) 5
(C) $\sqrt{155}$
(D) 0

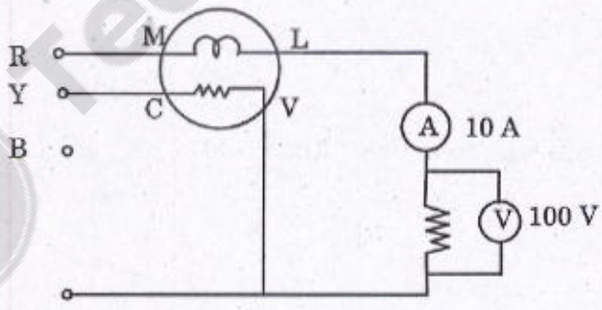
77. A DC ammeter has a resistance of 0.1Ω and its currents range is $0-100\,A$. If the range is to be extended to $0-500\,A$, then the shunt resistance should be :

(A) 0.5Ω
(B) 0.25Ω
(C) 0.025Ω
(D) 0.05Ω

78. A single phase energy meter is operating on 200 V, 50 Hz supply with a load of 10 A for two hours at 0.8 p.f. The meter takes 1800 revolutions in that period. The meter constant is :

(A) 1800 rev/kwh
(B) 900 rev/kwh
(C) 1000 rev/kwh
(D) 500 rev/kwh

79. What will be the reading on the wattmeter connected in the following figure? Assume balanced supply :



(A) 500 W
(B) −1000 W
(C) 1000 W
(D) −500 W

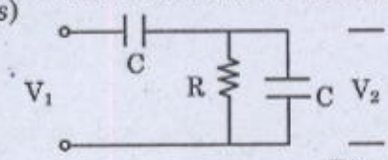
80. Which of the following device will be chosen to measure the flow of fluid in open channel?

(A) Pilot tube
(B) Ring Balance flow meter
(C) Rotameter
(D) Piston flow meter

81. A system is having a transfer function of $\frac{1}{s+a}$. What will be its impulse response?

(A) t (B) e^{-at}
(C) t^2 (D) e^{at}

82. The transfer function $\frac{V_2(s)}{V_1(s)}$ of the circuit shown below is :



(A) $\frac{2RCS}{1+RCS}$ (B) $\frac{2RCS}{CS\,(1+RCS)}$
(C) $\frac{1+2RCS}{CS\,(1+RCS)}$ (D) $\frac{1+RCS}{1+2RCS}$

83. For the unity feed back control system whose open loop transfer function is $\frac{1}{s(s+1)}$, the natural frequency of oscillation is :

(A) 2 rad/sec (B) 0.5 rad/sec
(C) 5 rad/sec (D) 1 rad /sec

84. The number of roots on the equation $2s^4 + s^3 + 2s^2 + 5s + 7 = 0$ that lie in the right half of s-plane is:

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

85. The loop gain GH of a closed loop system is given by the following expression $\frac{K}{s(s+2)\,(s+4)}$.

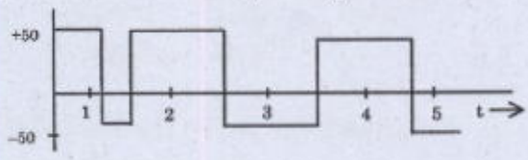
The value of K for which the system just becomes unstable is :

(A) 10 (B) 30
(C) 48 (D) 100

86. For a signal $f(t) = 15 \sin 4\pi t + 5 \cos 8\pi t + 3 \sin 18\pi t$, the minimum sampling frequency should be :

(A) 18 (B) 9
(C) 8 (D) 16

87. What is the rms value of the following voltage waveform?



(A) 40 V (B) 50 V
(C) 100 V (D) $50/\sqrt{2}$

88. Given two continuous time signals $X(t) = e^{-t}$ and $y(t) = e^{-2t}$ which exist for $t > 0$, their convolution is :

(A) e^{-t} (B) $e^{-t} - e^{-2t}$

(C) e^{-2t} (D) $e^{-t} + 2e^{-2t}$

89. A rectangular current pulse of duration T and magnitude 1 has the Laplace transform :

(A) 1 (B) $1 - e^{-Ts}$

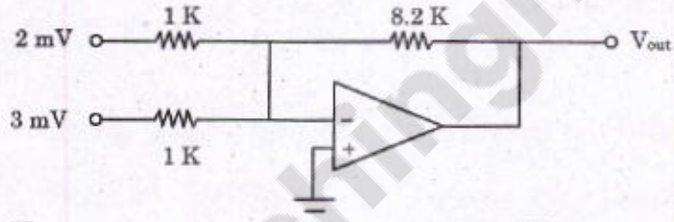
(C) $\frac{1 - e^{-Ts}}{s}$ (D) s

90. For the function $F(s) = \frac{10}{s(s^2 + 10s + 1)}$ the initial value of $f(t)$ is equal to :

(A) 10 (B) 1

(C) 0 (D) ∞

91. What does V_{out} equal in the following figure?



(A) -41 mV (B) 5 V

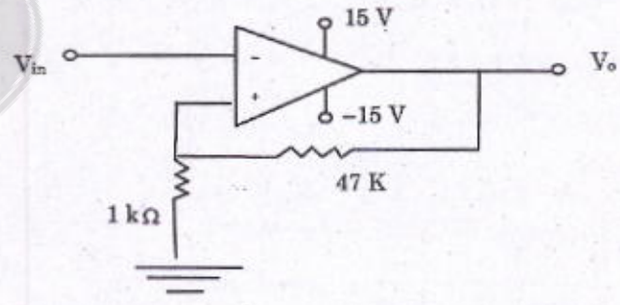
(C) 8.2 V (D) 41 mV

92. For a Butter worth filter of second order, the gain of the amplifier should be :

(A) 1.414 (B) 1

(C) 2 (D) 1.586

93. What are the trip points of the following Schmitt trigger circuit?



(A) $0V$ and $1V$ (B) $+0.127$ and -0.127

(C) $+0.271$ and $-0.271\ V$ (D) $+0.32$ and $-0.32\ V$

94. The number of times the instruction sequence below will loop before coming out of loop is :

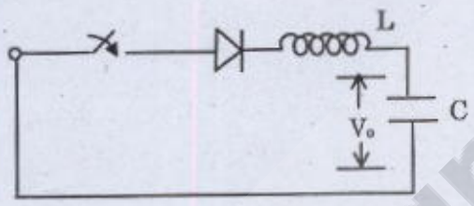
```
A:  MOV  AL,  OOH
    INC  AL
    JNZ  A
```

(A) 256 (B) 255
(C) 0 (D) 100

95. For the DAC shown below, what is the resolution for digital inputs of 0 and 1?

(A) 0.125 v/bit (B) 0.117 v/bit
(C) 0.1 v/bit (D) 0.2 v/bit

96. In the following figure, if $C = 10\,\mu F$ and L = 1mH, and $V_o = 100\,V$, the peak current through the diode is :



(A) 100 A (B) 50 A
(C) 10 A (D) 5 A

97. If the supply voltage to a 3 phase full wave controlled rectifier is 100 V (rms line – to – line), what is the maximum average voltage output possible?

(A) $100\sqrt{2}\,V$ (B) 234 V
(C) 117 V (D) 135 V

98. The lowest dominant harmonic frequency component from a sine – triangle PWM voltage with a carrier frequency of 1 kHz and modulating voltage of 50 Hz is :

(A) 50 Hz (B) 150 Hz
(C) 100 Hz (D) 1 kHz

99. Which time harmonic order voltage will produce negative torque in an induction machine?

(A) 5^{th} (B) 7^{th}
(C) 3^{rd} (D) 13^{th}

100. In a sine – PWM modulating sine wave, 10 V peak of 3^{rd} harmonic component was added. What will be the 3^{rd} harmonic component in the line – to – line voltage output?

(A) 17.3 V (B) $\frac{10}{\sqrt{2}}$ V
(C) 0 V (D) 10 V