

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 Arangathekkku 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 Shackles" 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^6 in the expansion of $\left(2x - \frac{1}{2x}\right)^{20}$ is the :

(A) 12th term

(B) 8th term

(C) 7th term

(D) 6th 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 $\lim_{x \rightarrow 2/3} \frac{27x^3 - 8}{27x - 18}$ 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

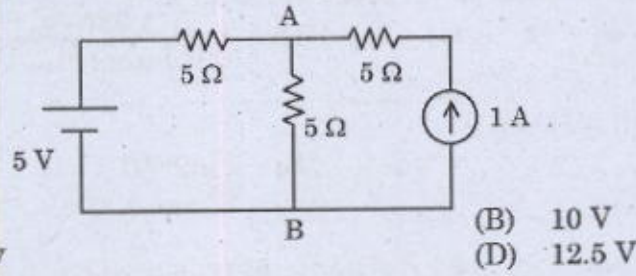
(C) $\sqrt{2}$

(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 $\tan x \frac{dy}{dx} + y = \operatorname{cosec} x \tan x$ is :
- (A) $y \sin x = x + C$ (B) $y \operatorname{cosec} x + \cot x = C$
(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) M₁₀ (B) M₁₅
(C) M₂₀ (D) M₂₀₀
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 point 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

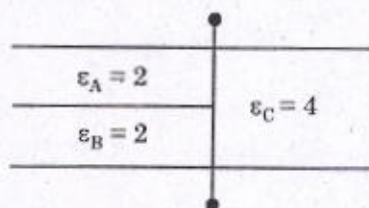
39. A Kaplan turbine is preferred when the available head is :
- (A) Low (B) Medium
(C) High (D) None of these
40. In a nuclear reactor, heavy water can be ideally used as :
- (A) Biological shield (B) Moderator
(C) Control rods (D) All of the above
41. Form factor is equal to :
- (A) $\frac{\text{Average value}}{\text{r.m.s. value}}$ (B) $\frac{\text{r.m.s. value}}{\text{Average value}}$
(C) $\frac{\text{r.m.s. value}}{\text{instantaneous value}}$ (D) $\frac{\text{Average value}}{\text{instantaneous value}}$
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 resistors 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) $\sqrt{R^2 + (X_L - X_C)^2}$ (B) $\sqrt{R^2 - (X_L - X_C)^2}$
(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) $4\pi\epsilon$ (B) $8\pi\epsilon_0$
 (C) $0.8\pi\epsilon$ (D) $1.25\pi\epsilon$
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 $2\mu\text{F}$, what is the total capacitance?



- (A) $3\mu\text{F}$ (B) $8\mu\text{F}$
 (C) $2\mu\text{F}$ (D) $4\mu\text{F}$
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) $> 40\text{ W}$ (B) $< 40\text{ W}$
 (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°