

## COMPREHENSIVE EXAMINATION

(Part II – Objective type)

### PATTERN

1. MA101 Calculus – 1 question
2. MA103 Differential Equations – 1 question
3. BE100 Engineering Mechanics – 2 questions
4. BE110 Engineering Graphics – 2 questions
5. BE103 Sustainable Engineering – 2 questions
6. BE102 Design & Engineering – 2 questions
7. 6 Branch specific core courses published in the website – 40 questions  
( minimum 6 questions from each course)

Maximum marks : 50

Exam Duration : 1 hour

- Instructions:** (1) Each question carries one mark. No negative marks for wrong answers  
(2) Total number of questions: 50  
(3) All questions are to be answered. Each question will be followed by 4 possible answers of which only ONE is correct.  
(4) If more than one option is chosen, it will not be considered for valuation.  
(5) Calculators are not permitted

### SAMPLE QUESTIONS

(Note: Only 12 sample questions are given here -1 from each course)

### QUESTIONS FROM COMMON COURSES

1.  $\lim_{x \rightarrow 0} \frac{\sin(2x)}{x} =$

- (A) 1                      (B) 2                      (C) 0                      (D)  $\infty$

2. The following partial differential equation used in nonlinear mechanics is

$$\frac{\partial w}{\partial t} + \frac{\partial^3 w}{\partial x^3} - 6w \frac{\partial w}{\partial x} = 0$$

- (A) linear; 3<sup>rd</sup> order                      (B) nonlinear; 3<sup>rd</sup> order  
(C) linear; 1<sup>st</sup> order                      (D) nonlinear; 1<sup>st</sup> order

3. The resultant of two forces equal in magnitude acting at a point has also the same magnitude as each force. The angle between the forces is

- (A).30°                      (B).45°                      (C).90°                      (D).120°

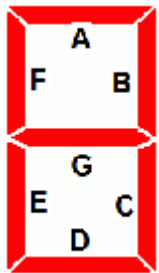
4. The front view in orthographic projection of a right circular cone with its base horizontal is  
(A). right angled triangle (B). scalene triangle (C). isosceles triangle (D). Circle

5. Which one of the following is NOT true with respect to sustainability approach in engineering ?

- A. Considers both technical and non-technical issues synergistically
- B. Strives to solve the problem for infinite future
- C. Considers the global context
- D. Considers the object or process

6. A seven-segment display (SSD) is commonly used in electronic calculators. It has seven different illuminating segments arranged in such a way that it can display numbers from 0-9 by displaying different combinations of segments. Normally segments B and C are used to show number 1.

Which one of the seven segments is the most critical one, that if fails, will show maximum erroneous readings.



A.A

B. C

C. D

D. G

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### BRANCH SPECIFIC QUESTIONS

#### AERONAUTICAL ENGINEERING

7. The second digit in NACA 6 –Series indicates  
(A) Series (B) Thickness in % of chord  
(C) Location of the minimum pressure in tenths of chord  
(D) % of the aerofoil chord over which the pressure distribution is uniform.
8. Combination of ----- and ----- is known as spool.  
(A) Compressor and turbine (B) Compressor and combustion chamber  
(C) Combustion chamber and turbine (D) Compressor, combn chamber and turbine
9. Flow past an airfoil is to be modelled using vortex sheet. The strength of the vortex sheet at the trailing edge will be  
(A) Zero (B) 1 (C) 2 (D) Infinite

10. Buckling of the fuselage skin can be delayed by  
 (A) Increase internal pressure (B) Placing stiffeners farther apart  
 (C) Reducing skin thickness (D) Placing stiffeners farther and decreasing internal pressure
11. Downstream velocity of ----- is subsonic  
 (A) Oblique wave (B) Normal wave  
 (C) Expansion wave (D) Both oblique and normal wave
12. Let an aircraft in a steady level flight be trimmed at certain speed. A level and steady flight at a higher speed be achieved by changing  
 (A) Throttle only (B) Elevator only  
 (C) Throttle and elevator together (D) None of the above

### APPLIED ELECTRONICS & INSTRUMENTATION ENGG.

7. According to the graph theory of loop analysis, how many equilibrium equations are required at a minimum level in terms of number of branches (b) and number of nodes (n) in the graph?  
 (A)  $n-1$  (B)  $b+(n-1)$  (C)  $b-(n-1)$  (D)  $b/n-1$
8. **Assertion (A):** Shunt of an ammeter has a low resistance.  
**Reason (R):** Shunt may be connected in series or in parallel with ammeter.  
 (A) Both A and R are true and R is correct explanation of A  
 (B) Both A and R are true but R is not correct explanation of A  
 (C) A is true R is false  
 (D) A is false R is true
9. Which of the following is not preferred for input stage of Op-amp?  
 (A) Dual Input Balanced Output  
 (B) Differential Input Single ended Output  
 (C) Cascaded DC amplifier  
 (D) Single Input Differential Output
10. Sensitivity of a sensor can be depicted by \_\_\_\_\_  
 (A) Nyquist plot (B) Pole-zero plot  
 (C) Bode plot (D) None of the mentioned
11. A logic circuit that provides a HIGH output for both inputs HIGH or both inputs LOW is  
 (A) Ex-NOR gate  
 (B) OR gate  
 (C) Ex-OR gate  
 (D) NAND gate
12. Velocity error constant of a system is measured when the input to the system is unit \_\_\_\_\_ function  
 (A) parabolic (B) ramp (C) impulse (D) step

## AUTOMOBILE ENGINEERING

7. An effective method of prevention of detonation is .....
- (A) cooling of charge (B) heating of charge  
(C) locating spark plug at one end of combustion chamber  
(D) reducing quantity of aromatics in fuel used
8. On suspended vacuum brakes, there is vacuum on both sides of the piston during.....
- (A) brake application (B) brake release  
(C) part application of brakes (D) all of these
9. The opening pressure of Pintle type nozzle varies from.....
- (A) 7 – 15 MPa (B) 11 - 22 MPa (C) 17 – 34 MPa (D) 35 – 45 MPa
10. The component of torque converter that allows multiplication of torque is ...
- (A) turbine (B) impeller (C) pump (D) stator
11. Rail that connects A pillar and C pillar .....
- (A) rub rail (B) cant rail (C) seat rail (D) waist rail
12. Process used in the detection of sub surface crack is .....
- (A) visual inspection (B) diesel chalk test (C) die penetrating test (D) ultra sonic test
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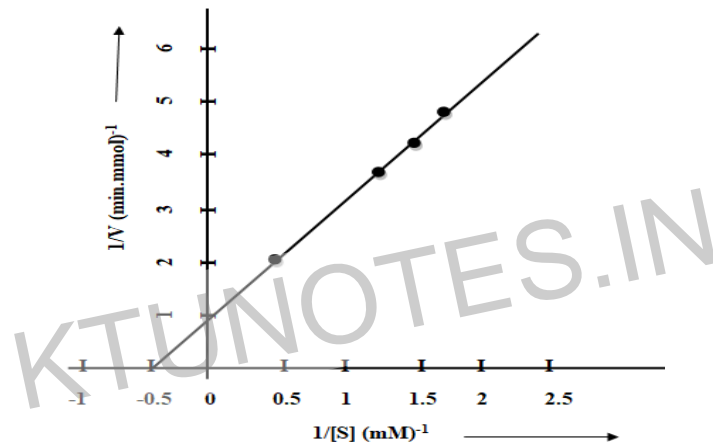
## BIOMEDICAL ENGINEERING

7. In ECG, \_\_\_\_\_ has the smallest amplitude.
- (A) P wave (B) QRS complex (C) T wave (D) U wave
8. The record of the spontaneous electrical activity of brain is called \_\_\_\_\_.
- (A) ECG (B) EEG (C) EMG (D) EP
9. A pulse width modulator circuit can be designed using IC 555 by applying the modulating signal at pin \_\_\_\_\_.
- (A) 7 (B) 5 (C) 4 (D) 2
10. The Fourier series expansion of an even periods function contains \_\_\_\_\_.
- (A) Only cosine terms (B) Cosine terms and a constant (C) Only sine terms  
(D) Sine terms and a constant
11. Plethysmography is a measurement technique based on \_\_\_\_\_.
- (A) Flow (B) Volume (C) Temperature (D) Pressure
12. Let go current limit of human body is in the range \_\_\_\_\_.
- (A) 10 mA (B) 100 mA (C) 1 A (D) 2 A
- 

## BIOTECHNOLOGY

7. Reynolds number signifies the ratio of
- (A) gravity forces to viscous forces (B) Inertial forces to viscous forces  
(C) Inertia forces to gravity forces (D) Buoyant forces to inertia forces
8. Which one of the following organisms is an indicator of fecal contamination?
- (A) *Escherichia coli* (B) *Streptococcus lactis*  
(C) *Bacillus subtilis* (D) *Lactobacillus acidophilus*
9. Pick out the correct statement.
- A) In unsteady state heat conduction, heat flows in the direction of temperature rise.  
B) 1 kcal/hr.m.°C is equal to 1 BTU/hr. ft.°F.

- C) In steady state heat conduction, the only property of the substance which determines the temperature distribution is the thermal conductivity.
- D) In heat transfer by forced convection, Grashoff number is very important.
10. Choose the correct order of transport of protein in a secretory pathway?
- A) Protein synthesized in the cytoplasm->SER lumen->RER lumen->cis golgi->median golgi->trans golgi->vesicles->fusion of vesicles with plasma membrane-> exocytosis
- B) Protein synthesized in the cytoplasm->RER lumen->cis golgi->median golgi->trans golgi->vesicles->fusion of vesicles with plasma membrane-> exocytosis
- C) Protein synthesized in the cytoplasm->vesicles->SER->RER lumen->cis golgi->median golgi->trans golgi->vesicles->fusion of vesicles with plasma membrane-> exocytosis
- D) Protein synthesized in the cytoplasm->RER lumen->trans golgi->median golgi->cis golgi->vesicles->fusion of vesicles with plasma membrane-> exocytosis
11. The basis for blue-white screening with pUC vectors is
- (A) Intraallelic complementation (B) Intergenic complementation
- (C) Intragenic suppression (D) Extragenic suppression
12. The graph shows the LB plot for an enzyme catalyzed reaction. Which of the following statements is correct?



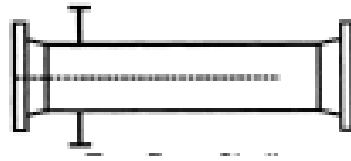
- A) The  $V_{\max}$  is 5mmol/min and with competitive inhibition  $V_{\max}$  remain unchanged
- B)  $K_m$  is 2mmol/min and with competitive inhibition both  $K_m$  and  $V_{\max}$  decrease.
- C)  $K_m$  is 0.5 mM and with competitive inhibition  $V_{\max}$  increase and  $K_m$  remain unchanged.
- D)  $K_m$  is 2mM and with competitive inhibition  $K_m$  increase and  $V_{\max}$  remain unchanged.

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## CHEMICAL ENGINEERING

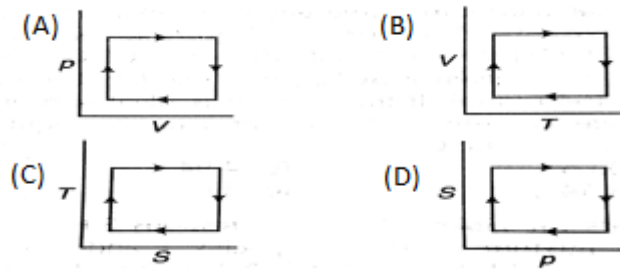
7. Bernoulli equation deals with law of conservation of ..... and Navier Stokes equation deals with the law of conservation of .....
- (A) mass ; energy
- (B) momentum ; mass
- (C) mass ; work
- (D) energy ; momentum

8. The schematic representation of a shell and tube heat exchanger shown below represents



- (A) One- pass shell
- (B) Two- pass shell
- (C) Split- flow shell
- (D) Cross -flow shell

9. Which of the following represents the Carnot Cycle (ideal engine)?

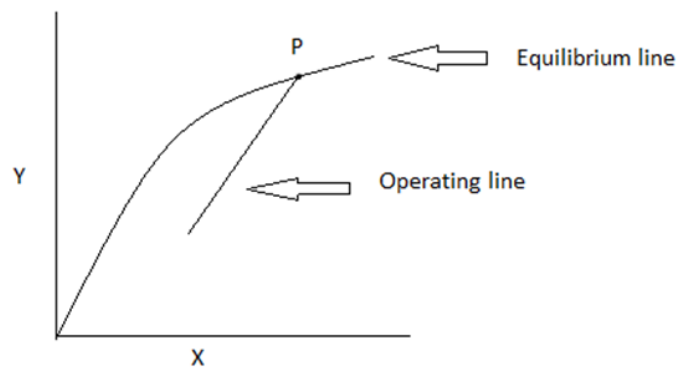


10. Match the following PFD symbols with correct equipment

1		P	Heater
2		Q	Plug Flow Reactor
3		R	Mixer
4		S	Continuous Stirred Tank Reactor

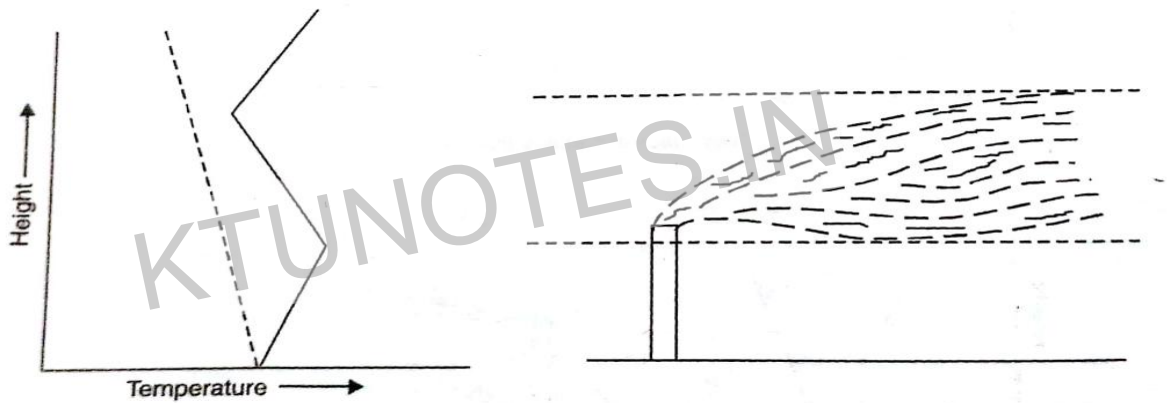
- (A) 1-P, 2-Q, 3-R, 4-S
- (B) 1-Q, 2-S, 3-P, 4-R
- (C) 1-R, 2-P, 3-Q, 4-S
- (D) 1-S, 2-R, 3-P, 4-Q

11. The equilibrium and operating line of a vapour liquid separation process is given below with vapour composition Y on the ordinate and liquid composition X on the abscissa. The driving force at the point P in the diagram is .....



- (A) One
- (B) Greater than one
- (C) Zero
- (D) Infinity

12. In the graph given below, dotted line represents the dry adiabatic lapse rate and the bold line represents the ambient lapse rate. The behaviour of the plume under this situation is called



- (A) Coning
- (B) Tapping
- (C) Looping
- (D) Lofting

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## CIVIL ENGINEERING

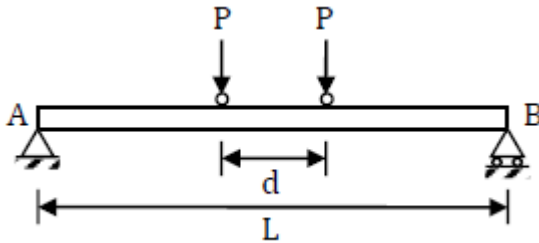
7. The maximum shear stress in a solid shaft of circular cross section having diameter 'd' subjected to a torque T is  $\tau$ . If the torque is increased to four times and diameter of the shaft is increased by two times, then the maximum shear stress in the shaft will be:

- (A)  $2\tau$
- (B) T
- (C)  $\tau/2$
- (D)  $\tau/4$

8. A steady irrotational flow of an incompressible fluid is known as:

- (A) streamline flow
- (B) creeping flow
- (C) shear flow
- (D) potential flow

9. A simply supported beam AB of span,  $L = 24$  m is subjected to two wheel loads acting at a distance,  $d = 5$  m apart as shown in the figure below. Each wheel transmits a load,  $P = 3$  kN and may occupy any position along the beam. If the beam is an I-section having section modulus,  $S = 16.2 \text{ cm}^3$ , the maximum bending stress (in GPa) due to the wheel loads is \_\_\_\_\_



- (A) 1769.5                      (B) 1759.2                      (C) 175.92                      (D) 1.759

10. The characteristic strength of a material is defined as the strength below which:

- (A) not more than 5% of the test results fall  
 (B) not less than 5% of the test results fall  
 (C) not more than 50% of the test results fall  
 (D) not more than 25% of the test results fall

11. According to Darcy's law for flow through porous media, velocity is proportional to;  
 (A) Effective stress    (B) Hydraulic Gradient    (C) Cohesion    (D) Stability Number

12. The flexural tensile strength of M25 grade of concrete, in  $\text{N/mm}^2$ , as per IS:456-2000 is:  
 (a) 3.5                      (b) 3                      (c) 3.75                      (d) 4.5

### COMPUTER SCIENCE & ENGINEERING

7. Given the relations  $R_1$ ,  $R_2$  and  $R_3$ , determine which of the following statements are true?  
 $R_1 = \{ (1,1), (1,2), (2,3), (1,3), (4,4) \}$      $R_2 = \{ (1,1), (1,2), (2,1), (2,2), (3,3), (4,4) \}$      $R_3 = \{ (1,3), (3,1), (2,3) \}$
- 1)  $R_1$  is not symmetric
  - 2)  $R_2$  is not anti-symmetric
  - 3)  $R_3$  is neither symmetric nor anti-symmetric
  - 4)  $R_2$  is symmetric
- A. 1 and 4  
 B. 1, 3 and 4  
 C. 1,2 and 4  
 D. All the above

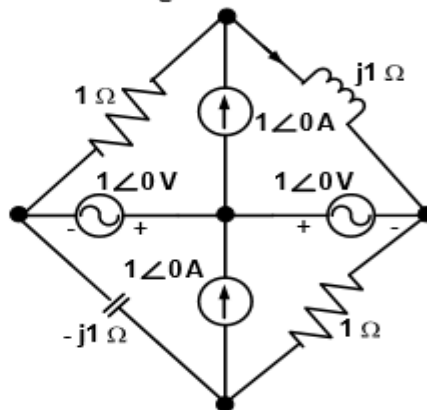


8. The regular expression  $0^*(10^*)^*$  denotes the same set as
- $(1^*0)^*1^*$
  - $0^+(0+10)^*$
  - $(0+1)^*10(0+1)^*$
  - None of the above.
9. Which of the relational algebraic expression is equivalent to the following SQL statement, *SELECT A<sub>1</sub>, A<sub>2</sub> FROM r<sub>1</sub>, r<sub>2</sub> WHERE p* in which A<sub>1</sub> is a key attribute, r<sub>1</sub> and r<sub>2</sub> relations and p is a predicate
- $\prod_{A_1, A_2} (\sigma_p (r_1 \times r_2))$
  - $\prod_{r_1, r_2} (\sigma_p (A \times B))$
  - $\sigma_p (r_1 \times r_2)$
  - None of the above
10. Let P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> be three different processes with CPU Burst time 24, 3 and 3 ms respectively. Assume that all the processes arrive at time 0. If they are scheduled using Round Robin Scheduling algorithm, what is the average waiting time of each process?
- 17
  - 5.66
  - 3
  - 6.56
11. If the pre-order and in-order sequences of a binary tree are 1 5 7 3 9 and 7 5 3 1 9, respectively, then its post-order sequence is,
- 5 1 7 9 3
  - 7 3 5 9 1
  - 7 5 3 9 1
  - 7 9 3 1 5
12. A certain processor supports only immediate and direct addressing modes. Which of the following programming language features cannot be implemented on this processor?
- Pointers
  - Arrays
  - Records
  - All of these

## ELECTRICAL & ELECTRONICS ENGG.

7.

In the circuit shown below, the current through the inductor is



(A)  $\frac{2}{1+j}$  A

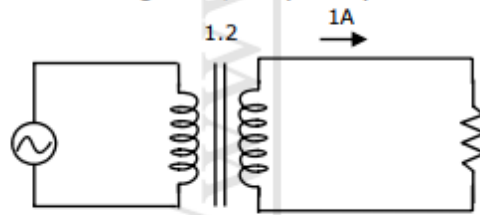
(B)  $\frac{-1}{1+j}$  A

(C)  $\frac{1}{1+j}$  A

(D) 0 A

8.

A single-phase transformer has a turns ratio of 1:2, and is connected to a purely resistive load as shown in the figure. The magnetizing current drawn is 1A, and the secondary current is 1A. If core losses and leakage reactance's are neglected, the primary current is



- (A) 1.41A      (B) 2A      (C) 2.24 A      (D) 3 A

9.

Consider the following Sum of Products expression, F.

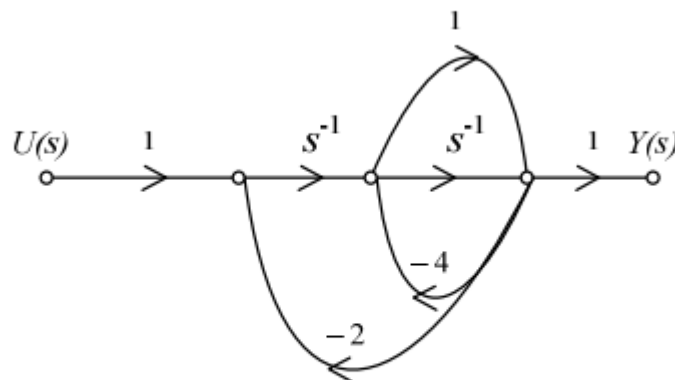
$$F = ABC + \bar{A}\bar{B}C + A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}\bar{C}$$

The equivalent Product of Sums expression is

- (A)  $F = (A + \bar{B} + C)(\bar{A} + B + C)(\bar{A} + \bar{B} + C)$   
 (B)  $F = (A + B + \bar{C})(A + B + C)(\bar{A} + \bar{B} + \bar{C})$   
 (C)  $F = (\bar{A} + B + \bar{C})(A + \bar{B} + \bar{C})(A + B + C)$   
 (D)  $F = (\bar{A} + \bar{B} + C)(A + B + \bar{C})(A + B + C)$

10.

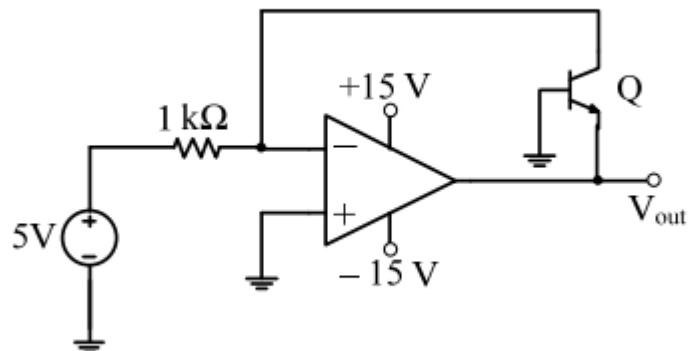
The signal flow graph for a system is given below. The transfer function  $\frac{Y(s)}{U(s)}$  for this system is



- (A)  $\frac{s+1}{5s^2+6s+2}$       (B)  $\frac{s+1}{s^2+6s+2}$   
 (C)  $\frac{s+1}{s^2+4s+2}$       (D)  $\frac{1}{5s^2+6s+2}$

11.

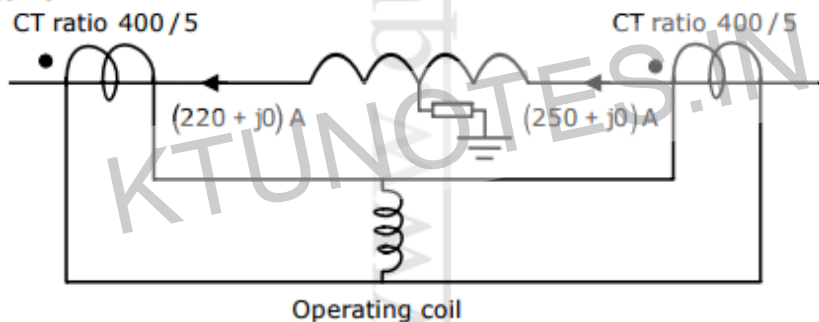
In the circuit shown below what is the output voltage ( $V_{out}$ ) in Volts if a silicon transistor Q and an ideal op-amp are used?



- (A) -15                      (B) -0.7                      (C) +0.7                      (D) +15

12.

Consider a stator winding of an alternator with an internal high-resistance ground fault. The currents under the fault condition are as shown in the figure. The winding is protected using a differential current scheme with current transformers of ratio 400/5 A as shown. The current through the operating coil is



- (A) 0.17875 A              (B) 0.2 A                      (C) 0.375A                      (D) 60 kA

## ELECTRONICS & BIOMEDICAL ENGINEERING

7. Second heart sound is caused by the closing of the \_\_\_\_\_.  
 (A) Tricuspid valve    (B) Aortic valve    (C) Bicuspid valve    (D) Mitral valve
8. A mod-6 counter with 3 flip flops will skip \_\_\_\_\_ counts.  
 (A) 4                      (B) 3                      (C) 2                      (D) 1
9. The lower threshold and upper threshold voltages of a 555 timer IC are \_\_\_\_\_ and \_\_\_\_\_ respectively.  
 (A)  $\frac{1}{2} V_{cc}$ ,  $\frac{1}{3} V_{cc}$     (B)  $\frac{1}{3} V_{cc}$ ,  $\frac{1}{2} V_{cc}$     (C)  $\frac{1}{3} V_{cc}$ ,  $\frac{2}{3} V_{cc}$     (D)  $\frac{2}{3} V_{cc}$ ,  $\frac{1}{3} V_{cc}$
10. \_\_\_\_\_ system is an example of a non-recursive system.  
 (A) Causal IIR              (B) Non causal IIR    (C) Non causal FIR    (D) Causal FIR
11. \_\_\_\_\_ is not an example of a temperature transducer.  
 (A) Thermistor              (B) Liquid crystals    (C) Thermocouple    (D) None of the above

12. The size of flag register in 8051 is \_\_\_\_\_.  
(A) 8 (B) 16 (C) 20 (D) 32

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### ELECTRONICS & COMMUNICATION ENGINEERING

7. The internal resistance of an ideal voltage source is:  
(A) Zero (B) infinity (C) same as load resistance (D) to be determined
8. Which among the below mentioned devices acts as a driver in CMOS Inverter circuit?  
(A) PMOS (B) NMOS (C) Both a and b (D) None of the above
9. What is the minimum number of two-input NAND gates used to perform the function of two input OR gate?  
(A) One (B) Two (C) Three (D) Four
10. In Laplace transform, multiplication by  $e^{-at}$  in time domain becomes  
(A) translation by  $a$  in  $s$  domain (B) translation by  $(-a)$  in  $s$  domain  
(C) multiplication by  $e^{-as}$  in  $s$  domain (D) none of the above
11. What is the change in the bandwidth of the signal in FM when the modulating frequency increases from 12 KHz to 24KHz?  
(A) 40 Hz (B) 58 Hz (C) 24 Hz (D) Bandwidth remains unaffected
12. Calculate the wave impedance for TM mode in rectangular waveguide for dominant mode at 3 GHz having  
a. 300  $\Omega$  b. 377  $\Omega$  c. 226  $\Omega$  d. 629  $\Omega$

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### FOOD TECHNOLOGY

7. Canned sweetened condensed milk may be thickened by  
A. *Bacillus species* B. *Clostridium species* C. *Micrococcus species* D. *Saccharomyces species*
8. Ratio of inertial force to viscous force is \_\_\_\_ number  
A. Fourier B. Reynolds C. Biot D. Schmidt
9. In a reversible, constant pressure, non flow process, heat input is given by  
A. change in internal energy B. change in enthalpy C. change in entropy D. work output
10. The time required for constant rate filtration is \_\_\_\_ times the constant pressure filtration.  
A. 5 B. 2 C. 3 D. None of these
11. The value of constant 'n' in energy requirement calculation for Bond's Law for milling is  
A. -2 B. -1 C. -2/3 D. -3/2
12. Which among the four is used as an index of analyte concentration in u-v visible spectroscopy.  
A. Relative transmittance B. Chemical nature of analyte C. Radiation source  
D. Concentration of analyte

## INDUSTRIAL ENGINEERING

7.If the number of arrivals during a given time period is independent of the number of arrivals that have already occurred prior to the beginning of time interval, then the new arrivals follow -----distribution.

- (A) Erlang      (B) Poisson      (C) Exponential      (D) Normal

8.Which one is generally not true of work sampling?

- (A) There is little or no disruption of work.  
(B) Workers tend to be resentful because it is less accurate than time study.  
(C) It is not well suited for short tasks.  
(D) There is less detail about the job than with time study.

9.Which of the following is not a function of flux that is added during casting of cast iron?

- (A) absorb impurities  
(B) replenishes material loss  
(C) protects casting from oxidation  
(D) forms slag

10.A drill considered as a cutting tool having zero rake, is known as a

- (A) Flat drill  
(B) Straight fluted drill  
(C) Parallel shank twist drill  
(D) Tapered shank twist drill

11.The continuity equation is the result of application of the following law to the flow field

- (A) First law of thermodynamics  
(B) Conservation of energy  
(C) Newton's second law of motion  
(D) Conservation of mass

12.Any point on a link connecting double slider crank chain will trace a

- (A) circle  
(B) straight line  
(C) ellipse  
(D) parabola
- 

## INFORMATION TECHNOLOGY

7. ----- traversal entails the following steps;

- i). Traverse the left subtree ii). Visit the root node iii). Traverse the right subtree  
(A) Pre-order      (B) Post-order      (C) In-order      (D) None of these

8.----- register holds the instruction that is currently being executed.

- (A) PC      (B) IR      (C) MAR      (D) MDR

9. A relational schema R is said to be in ----- normal form if for every Multi-valued dependency  $X \twoheadrightarrow Y$  that holds over R, one of following is true

- X is subset or equal to (or)  $XY = R$ .  
➤ X is a super key.  
(A) 3NF      (B) BCNF      (C) 4NF      (D) 5NF

10. Consider the grammar

$S \rightarrow ABCc \mid Abc$

$BA \rightarrow AB$

$Bb \rightarrow bb$

$Ab \rightarrow ab$

$Aa \rightarrow aa$

Which of the following sentences can be derived by this grammar

- (A) abc                      (B) aab                      (C) abcc                      (D) abbb

11. The measure of the time from the submission of a request until the first response is produced is called -----

- (A) Waiting time    (B) response time    (C) Turnaround time    (D) compile time

12. A device used to connect two separate networks that use different communication protocols.

- (A) Repeaters              (B) Bridges    (C) Routers              (D) Gateway

### INSTRUMENTATION & CONTROL SYSTEMS

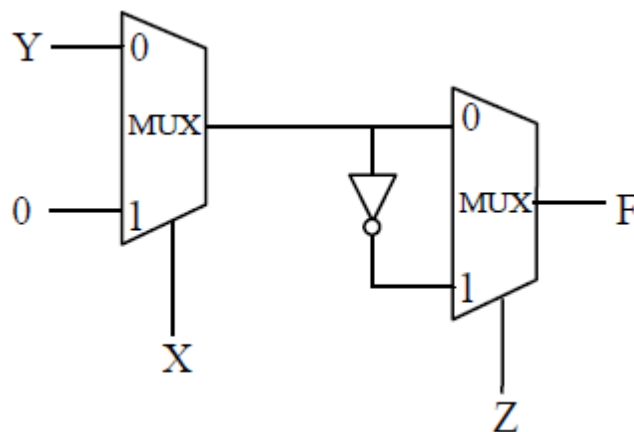
7. In frequency domain, speed of response is the measure of :-

- (A) Peak overshoot    (B) Bandwidth              (C) Cut off frequency    (D) Roll off rate

8. If a continuous time signal  $(t) = \cos(2\pi t)$  is sampled at 4Hz, the value of the discrete time sequence at  $n=5$  is

- (A) -0.707              (B) -1              (C) 0              (D) 1

9. Consider the circuit shown in the figure



The Boolean expression F implemented by the circuit is

- (A)  $\overline{XYZ} + XY + \overline{YZ}$                       (B)  $\overline{XYZ} + XZ + \overline{YZ}$   
 (C)  $\overline{XYZ} + XY + \overline{YZ}$                       (D)  $\overline{XYZ} + XZ + \overline{YZ}$

10. Of the given choices, which is the area of application for all-pass filters?

- (A) Cathode ray oscilloscope    (B) Television              (C) Telephone wire    (D) None of these

11. LVDT is used for the measurement of

- A) Temperature                      B) Flow                      C) Humidity                      D) Displacement

12. Output of a bi-metallic element is

- ( A) Strain                      (B)Pressure                      (C)Displacement                      ( D) Voltage

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### MECHANICAL ENGINEERING

7. If Poisson's ratio of a material is 0.5, then the elastic modulus of the material is

- (A) three times its shear modulus                      (B) four times the shear modulus  
(C) equal to the shear modulus                      (D) indeterminate

8. An ideal heat engine absorbs heat at 127°C and rejects at 77°C. The efficiency is

- (A) 13 %                      (B) 39 %                      (C) 50 %                      (D) 40 %

9. The essential ingredient of any hardened steel is

- (A) Austenite                      (B) Pearlite                      (C) Martensite                      (D) Cementite

10. Pelton wheel is a

- (A) medium discharge low head turbine  
(B) high discharge low head turbine  
(C) medium discharge medium head turbine  
(D) low discharge high head turbine

11. Which one of the following is an advantage of forging

- (A) good surface finish                      (B) low tooling cost  
(C) close tolerance                      (D) improve physical properties

12. The number of instantaneous centres of rotation for a 10 link kinematic chain is

- (A) 36                      (B) 90                      (C) 120                      (D) 45

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### MECHANICAL ENGINEERING (AUTO)

7. Out of the following which wheel alignment factor provides directional stability

- (A) Camber Angle                      (B) Caster Angle                      (C) King Pin Inclination                      (D) Toe-in

8. The example of a spherical pair is

- (A) Bolt and Nut                      (B) Lead screw of a lathe  
(C) Ball and Socket Joint                      (D) Ball Bearing and roller bearing

9. Stoichiometric Air Fuel ratio for a gasoline engine is

- (A) 8:1                      (B) 12:1  
(C) 14.7:1                      (D) 17:1

10. Double declutching is not essential in ----- type of gear box

- (A) Synchronesh Gear box                      (B) Constant mesh gear box  
(C) Sliding mesh gear box                      (D) None of the above

11. Present Gasoline used in Indian vehicles has an octane rating of  
(A) 76 (B) 87  
(C) 90 (D) 93
12. For Gear box which of the following lubricant grade is used  
(A) SAE 30 (B) SAE 20W40  
(C) SAE 120 (D) SAE 90
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## MECHANICAL ENGINEERING(PRODUCTION)

7. Which of the following instrument can be used for measuring speed of a submarine moving in deep sea  
(A) Venturimeter (B) Orifice plate (C) hot wire anemometer (D) pitot tube.
8. Which of the following welding processes uses non- consumable electrode ?  
(A). Shielded metal -arc welding (B). Submerged arc welding  
(C). TIG welding (D). MIG welding
9. In which of the following forging operation instead of repeated hammering gradual force is applied?  
(A) Drop forging (B) Smith forging (C) Coining (D) Press forging
10. The angle between side cutting edge and end cutting edge is called as  
(A). approach angle (B) nose angle (C) side relief angle  
(D) end relief angle
11. Which one of the following is an advantage of forging  
(A) good surface finish (B) low tooling cost  
(C) close tolerance (D) improve physical properties
12. The number of instantaneous centres of rotation for a 10 link kinematic chain is  
(A) 36 (B) 90 (C) 120 (D) 45
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## MECHATRONICS

7. Which of the following temperature measuring devices work by generating thermo electric potential  
(A) RTD (B) Thermocouple (C) Pyrometer (D) Thermistor
8. Stoke is the unit of \_\_\_\_\_.  
(A) kinematic viscosity in C. G. S. units (B). kinematic viscosity in M. K. S. units  
(C) dynamic viscosity in M. K. S. units (D). dynamic viscosity in S. I. units
9. Hall Effect sensors are used in  
(A) Flow meter (B). Fuel level indicator  
(C) Both (A) and (B) (D) None of the above



10. The capacitance in, force current analogy is analogous to  
 (A) Momentum (B) velocity (C) displacement (D) mass
11. The instruction that pushes the contents of the specified register/memory location on to the stack is  
 (A) PUSHF (B) POP (C) POPF (D) PUSH
12. PLCs means \_\_\_\_\_ Logic Controller  
 (A) Pneumatic (B) Peripheral (C) Programmable (D) Periodic
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## METALLURGY

7. Isothermal compressibility of a material is given by

(A)  $-\frac{1}{p} \left( \frac{\partial V}{\partial p} \right)_T$

(B)  $\frac{1}{p} \left( \frac{\partial V}{\partial p} \right)_T$

(C)  $-\frac{1}{V} \left( \frac{\partial V}{\partial p} \right)_T$

(D)  $\frac{1}{V} \left( \frac{\partial V}{\partial p} \right)_T$

8. If  $d$  is the inter-planar spacing of the planes  $\{h k l\}$ , the inter-planar spacing of the planes  $\{nh nk nl\}$ ,  $n$  being an integer, is  
 (A)  $D$  (B)  $d/n$  (C)  $nd$  (D)  $d/n^2$

9. The property of a material that CANNOT be significantly changed by heat treatment is  
 (A) Yield strength (B) Ultimate tensile strength  
 (C) Ductility (D) Elastic modulus
10. Which of the following is NOT a fusion welding process?  
 (A) Arc welding (B) Gas welding  
 (C) Resistance welding (D) Friction stir welding
11. During LD blow in steelmaking the impurity that gets removed first is  
 (A) Carbon (B) Phosphorous (C) Manganese (D) Silicon
12. The riser is designed such that the melt in the riser solidifies  
 (A) Before casting solidifies (B) At the same time as casting solidifies  
 (C) After casting solidifies (D) Irrespective of the solidification of the casting
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## NAVAL ARCHITECTURE & SHIP BUILDING

7. Ships are subjected to various rotational and translational motions while in a seaway. Which of the following is not a motion of vessel?

- (A) Pitch            (B) Roll            (C) Trim            (D) Yaw

8. The edge of the propeller which cuts the water first when the ship is driven ahead is known as \_\_\_\_\_.

- (A) Face            (B) Trailing edge            (C) Leading edge            (D) Driving edge

9. The displacement of a box shaped vessel (100 m x 20 m x 10 m) floating at 5 m draft in fresh water is \_\_\_\_\_.

- (A) 10000 T            (B) 20000 T            (C) 50000 T            (D) None of the above

10. ----- is an empirical measure for describing wind intensity based on observed sea conditions.

- (A) Wave spectrum            (B) Beaufort scale            (C) Wind speed            (D) Sea state code

11. Maximum permitted transverse spacing in a ship's double bottom space is \_\_\_\_\_.

- (A) 2.5 m            (B) 3 m            (C) 3.7 m            (D) 3.8 m

12. When a vessel is stationary and IS in the hogging condition, the main deck will be under \_\_\_\_\_.

- (A) Compressive stress            (B) Tensile stress            (C) Shear stress            (D) Racking stress

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## PRODUCTION ENGINEERING

7. In the following material removing process the amount of energy consumption for unit volume of material removal is maximum in

- (A) Turning            (B) Grinding            (C) Reaming            (D) Milling

8. The optimum pouring time for a casting depends on several factors. One important factor among them is

- (A) Location of riser            (B) Porosity of sand mold  
(C) Fluidity of casting metal            (D) Area of the pouring basin

9. For underwater welding which of the following process is not used

- (A) Shielded metal arc welding            (B) Electroslag welding  
(C) Gas tungsten arc welding            (D) Gas metal arc welding

10. For the given statements: 1) Mating spur gear teeth is an example of higher pair 2) A revolute joint is an example of lower pair

- (A) Both 1 and 2 are false            (B) 1 is true and 2 is false  
(C) 1 is false and 2 is true            (D) Both 1 and 2 are true

11. The following holds the work piece securely in a jig or fixture against the cutting forces  
(A) Locating device                      (B) Clamping device  
(C) Guiding device                      (D) Indexing device
12. In value engineering, the term value refers to  
(A) total cost of the product                      (B) selling price of the product  
(C) manufacturing cost of the product                      (D) utility of the product
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### SAFETY & FIRE ENGINEERING

7. Which of the following colour is used for radiation hazard?  
(A) Red                      (B) Orange                      (C) Green                      (D) Purple
8. The propagation of combustion is associated with shock wave at supersonic velocity is called as .....  
(A) Detonation      (B) Deflagration      (C) UVCE                      (D) BLEVE
9. The method of supporting the structure, either temporarily or permanently and thereby transferring the load on it while modifying an existing foundation.  
(A) Underpinning                      (B) Underwater works                      (C) Shoring      (D) Scaffolding
10. For sizing of fine materials, the most suitable equipment is a  
(A) Grizzly                      (B) Trommel      (C) Shaking screen      (D) vibrating screen
11. What is the normal rate of Chest compression and Rescue breaths in CPR  
(A) 72 + 5                      (B) 15 + 4                      (C) 30 + 2                      (D) 5 + 1
12. Oil filled high Voltage Transformers are protected from fire can be done by.....  
(A) Fire blanket      (B) Wall Drenchers      (C) HVWS      (D) MVWS
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