# MARATHON CLASS

(BMC-ESE-PYQ-ONE-LINER)

01) The creep strains are
(a) caused due to dead loads only
(b) caused due to live loads only
(c) caused due to cyclic loads only
(d) independent of loads

02) The necessary and sufficient condition for a surface to be called as a free surface is
(a) no stress should be acting on it
(b) tensile stress acting on it must be zero
(c) shear stress acting on it must be zero
(d) no point on it should be under any stress

03) The axial movement of top surface of stepped column as shown in figure is
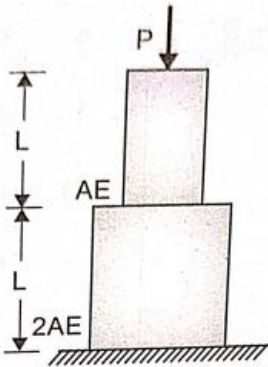
(a) 2.5 PL/AE
(b) 3 PL/AE
(c) 1.5 PL/AE
(d) 2 PL/AE

04) A failure theory postulated for metals is shown in a two dimensional stress plane. The theory is called
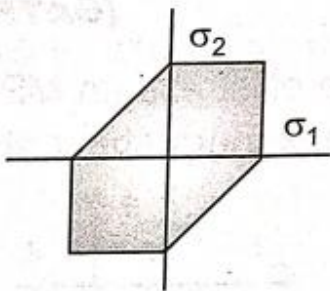
(a) Maximum distortion energy theory
(b) Maximum normal stress theory
(c) Maximum shearing stress theory
(d) Maximum strain theory

05) A long shaft of diameter d is subjected to twisting moment T at its ends. The maximum normal stress acting at its cross section is equal to
(a) Zero
(b) $16T/\pi d^3$
(c) $32T/\pi d^3$
(d) $64T/\pi d^3$

06) The values of liquid limit and plasticity index for soils having common geological origin in a restricted locality usually define
(a) a zone above A - line '
(b) a straight line parallel to A - line -
(c) a straight line perpendicular to A - line
(d) points may be anywhere in the plasticity chart

07) Principle involved in the relationship between submerged unit weight and saturated weight of a soil is based on
(a) Equilibrium of floating bodies
(b) Archimedes' principle
(c) Stokes' law
(d) Darcy's law

08) The toughness index of clayey soils is given by
(a) Plasticity index/Flow index
(b) liquid limit/Plastic limit
(c) Liquidity index/plastic limit
(d) Plastic limit/Liquidity index

09) Deposit with flocculated structure is formed when
(a) clay particles settle on sea bed
(b) clay particles settle on fresh water lake bed
(c) sand particles settle on river bed
(d) sand particles settle on sea bed

10) Compaction by vibratory roller is the best method of compaction in
case of
(a) moist silty sand
(b) well graded dry sand
(c) clay of medium compressibility
(d) silt of high compressibility
11) The dimension for kinematic viscosity is

(a) L/MT
(b) L/T^2
(c) L^2/T
(d) ML/T

12) Cavitation is caused by
(a) High veiocity
(b) Low pressure
(c) High pressure
(d) High temperature

13) The reading of differential manometer of a venturimeter, placed at 45° to the horizontal is 11 cm. If the venturimeter is turned to horizontal position, the manometer reading will be

(a) Zero
(b) $\frac{11}{\sqrt{2}} cm$
(c) 11 cm
(d) $11\sqrt{2}$

14) A body floating in a liquid in a stable state 01 equilibrium if its
(a) centre of gravity is below its centre of bouyancy
(b) metacentre lies below its centre of gravity
(c) metacentre coincides with its centre of gravity
(d) metacentre lies above its centre of gravity

15) The relation that must hold good for the flow to be irrotational is

(a) $\frac{\partial u}{\partial y} - \frac{\partial v}{\partial x} = 0$ (b) $\frac{\partial u}{\partial y} = \frac{\partial v}{\partial y}$

(c) $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0$ (d) $\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$

16) Bernoulli's equation is applicable for
(a) viscous and compressible fluid flow
(b) inviscid and compressible fluid flow
(c) inviscid and incompressible fluid flow
(d) viscous and incompressible fluid flow

17) The percentage error in the computed discharge over a triangular notch corresponding to an error of 1% in the measurement of the head over the notch would be ;
(a) 1.0
(b) 1.5

(c) 2.0
(d) 2.5

18) The discharge coefficient, C_d of an orifice meter is
(a) greater than the C_d of a venturimeter
(b) smaller than the C_d of a venturimeter .
(c) equal to the C_d of a venturimeter
(d) greater than one

19) A hydraulic jump takes place in a frictionless rectangular channel. The pre-jumped depth is y. The alternate and sequent depth corresponding to y are y_a and y_s respectively. The correct relationship among y ya and y_s is
(a) $y_a < y_s < y_P$
(b) $y_p < y_s < y_a$
(c) $y_P < y_s = y_a$
(d) $y_P = y_s = y_a$

20) The hydraulic jump always occurs from
(a) a M_2 curve to a M_1 curve
(b) a H_3 curve to a H_1 curve
(c) below normal depth to above normal depth
(d) below critical depth to above critical depth

21) Workability of concrete can be measured using slump, compaction factor and Vee bee time. Consider the following statements for workability of concrete.
(i) As the slump increases, the Vee bee time increases
(ii) As the slump increases, the compaction factor increases
Which of the following is TRUE?
(a) Both (i) and (ii) are True
(b) Both (i) and (ii) are False
(c) (i) is true and (ii) is false
(d) (i) is false and (ii) is true

22) Maximum possible value of Compacting factor for fresh (green) concrete is:
(a) 0.5
(b) 1.0
(c) 1.5
(d) 2.0

23) The cross-section of a thermo-mechanically treated (TMT) reinforcing bar has
(a) soft ferrite-pearlite throughout.
(b) hard martensite throughout.
(c) a soft ferrite-pearlite core with a hard martensitic rim.
(d) a hard martensitic core with a soft pearlite-bainitic rim.

24) Portland cement is manufactured by burning in a kiln the following materials
(a) limestone and alumina
(b) limestone and clay .
(c) limestone and sand
(d) lime and clay

25) According to IS 456-2000, which one of the following statements about the depth of neutral axis $X_{u,bal}$ for a balanced reinforce concrete section is correct?
(a) $X_{u,bal}$ depends on the grade of concrete only
(b) $X_{u,bal}$ depends on the grade of steel only
(c) $X_{u,bal}$ depends on the grade of concrete and grade of steel only
(d) $X_{u,bal}$ does not depends on the grade of concrete and grade of steel

26) Maximum strains in an extreme fibre in concrete and in the tension reinforcement (Fe-415 grade and E_s = 200 kN/mm^2) in a balanced section at limit state of flexure are respectively
(a) 0.0035 & 0.0038
(b) 0.002 & 0.0018
(c) 0.0035 & 0.0041
(d) 0.002 & 0.0031

27) Maximum strain at the level of compression steel for a rectangular section having effective cover to compression steel as d' and neutral axis depth from compression face X_u is

(a) $0.0035 \left(1 - \dfrac{d'}{X_u}\right)$ (b) $0.002 \left(1 - \dfrac{d'}{X_u}\right)$

(c) $0.0035 \left(1 - \dfrac{X_u}{d'}\right)$ (d) $0.002 \left(1 - \dfrac{X_u}{d'}\right)$

28) Tlie effective width of a reinforced concrete - beam flange under compression, according to IS. 456-1978, given *IQ* is the distance between the adjacent zero moment points, b is the breadth Oi the rib and D is the thickness of the flange, is

(a) $\dfrac{l_0}{6} + B + 6D$ (b) $l_0 + 6D$

(c) $\dfrac{l_0}{6} + 6D$ (d) $\dfrac{l_0}{6} + b$

29) In shear design of an RC beam, other than the allowable shear strength of concrete (TC),there is also an additional check suggested in IS 4562000 with respect to the maximum permissible shear stress (T_{cmax}). The check for T_{cmax} is required to take care of
(a) additional shear resistance from reinforcing steel
(b) additional shear stress that comes from , accidental loading
(c) possibility of failure of concrete by diagonal tension .
(d) possibility of crashing of concrete by diagonal compression

30) Pradhan Mantri Gram Sadak Yojna (PMGSY), launched in the year 2000, aims to provide rural connectivity with all-weather roads. It is proposed to connect the habitations in plain areas of population more than 500 persons by the year
(a) 2005
(b) 2007
(c) 2010
(d) 2012
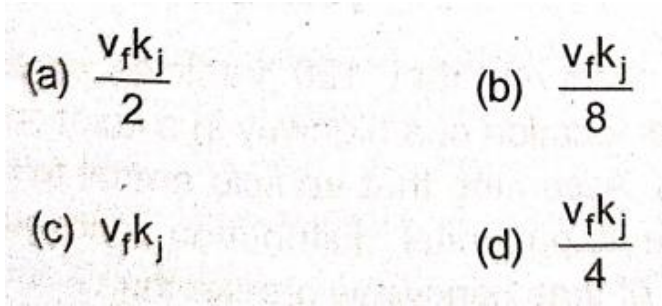
31) The star and grid pattern of road network was adopted in
(a) Nagpur Road Plan
(b) Lucknow Road Plan
(c) Bombay Road Plan
(d) Delhi Road Plan

32) The speed-density relationship in a mid-block section of a highway follows the Greenshield's model. If the free flow speed is V_f and the jam

density is k_j, the maximum flow observed on this ection is

(a) $\dfrac{v_f k_j}{2}$

(b) $\dfrac{v_f k_j}{8}$

(c) $v_f k_j$

(d) $\dfrac{v_f k_j}{4}$

33) The safety within a roundabout and the efficiency of a roundabout can be increased respectively by
(a) increasing the entry radius and increasing the exit radius.
(b) increasing the entry radius and decreasing the exit radius.
(c) decreasing the entry radius and increasing the exit radius.
(d) decreasing the entry radius and decreasing the exit radius.

34) Structural failures considered in the mechanistic method of bituminous pavement design are
(a) Shear and slippage
(b) Fatigue and Rutting
(c) Fatigue and shear
(d) Rutting and shear

35) in an earth work construction, a mass haul diagram is a diagram showing :
(a) the amount of cutting and *filling* along the length
(b) the cross-section of the site
(c) the cumulative volume of earth work and the haulage
(d) the longitudinal section of the site

36) The capitalised value of property fetching a ' net annual rent of Rs. 64000/- at the highest prevailing rate of interest of 8% is ;
(a) Rs. 800000/-
(b) Rs. 5,12,000/-
(c) Rs. 59,25,925/-
(d) Rs. 8,64,000/-

37) No deduction is made in the quantity estimation for brick work in cement mortar for

openings having size up to :
(a) 0.5 m²
(b) 1.0 m²
(c) 0.01 m²
(d) 0.1 m²

38) value of structures becomes less by them becoming out of date in style, structure in Resign etc. This is termed as:
(a) obsolescence
(C) Scrap value
(b) Capital cost
(d) Book value

39) book va,ue of a Property in a particular *yesii'* is the:
(a) value at the end of utility period
(b) original cost minus the amount of depreciation till date
(c) mark value
(d) original cost minus the amount of depreciation up to the previous year

40) An excavation is to be carried out in an H- rv soil for a foundation, which includes ft M 5 m and dis Postal up to 30 m This volume of earthwork that can be excavated have single beldar/maj door in one day as per Central Public
Works Department (CPWD) norms will be roughly equal to:
(a) 5 m3
(b) 3 m3
(c) 4 m3
(d) 2 m3

41) 'Deadman' is a term related to calculating quantities
(a)   Formwork
(b)   Cladding/roof convering
(c)   Brickwork in manholes
(d)   Excavation/earthwork

42) The estimate prepared on the basis of the built-up covered area at the floor level of any storey of a building is known as:
(a)   Plinth area estimate
(b)   Cubical content method
(c)   Unit base method
(d)   Building cost index estimate

43) Which of the following statements in relation to Valuation of a building is FALSE ?
V 1: Valuation is done either for buying or selling of the property.
V 2: By conducting valuation the future value of the property is determined.
V 3: Valuation is done for rent fixation of mortgaging.
(a) V2 only
(b) V1 and V3
(c) V3 only
(d) V1 only

44) The scrap value of a building may be about percentage of the total cost of construction
(a) 7%
(b) 1 %
(c) 5 %
(d) 10%

45) Water distribution systems are sized to meet the
(a) maximum hourly demand
(b) average hourly demand ,
(c) maximum daily demand and fire demand
(d) average demand and fire demand daily

46) As per IS 10500:2012, for drinking water in the absence of alternate source of water, the permissible limits for chloride and sulphate, in mg/L, respectively are
  (a) 250 and 200
(b) 1000 and 400
(c) 200 and 250
(d) 500 and 1000

47) 1 TCU is equivalent to the colour produced by
  (a) 1 mg/L of chloroplatinate ion
(b) 1 mg/L of platinum ion
(c) 1 mg/L platinum in form of chloroplatinate ion
(d) 1 mg/L of organo-chloroplatinate ion

48) Consider the following unit processes commonly used in water treatment; Rapid Mixing (RM), Flocculation (F), Primary Sedimentation (PS), Secondary Sedimentation (SS), Chlorination (C) and Rapid Sand Filtration (RSF). The order of these unit processes (first to last) in a conventional water treatment plant is
(a) PS → RSF → F→ RM → SS → C
(b) PS → F→ RM → RSF → SS → C
(c) PS → F→ SS → RSF → RM →
(d) CPS → RM → F → SS → REF → C

49) Use of coagulants such as alum
(a) results in reduction of pH of the treated water.
(b) results in increase of pH of the treated water.
(c) results in no change in pH of the treated water
(d) may cause and increase of decrease of pH of the treated water.

50) The following characteristics pertain to the sand filters used in water industry.
I. Filtration rate is 1 to 4 m³/ day.
II. Typical duration of operation in one run is 24 to 72 hours.
III. Operation cost is low.
Which of the above characteristic pertain to slow sand filters?
  (a) I, II and III
  (b) I and II
  (c) II and III
  (d) I and III