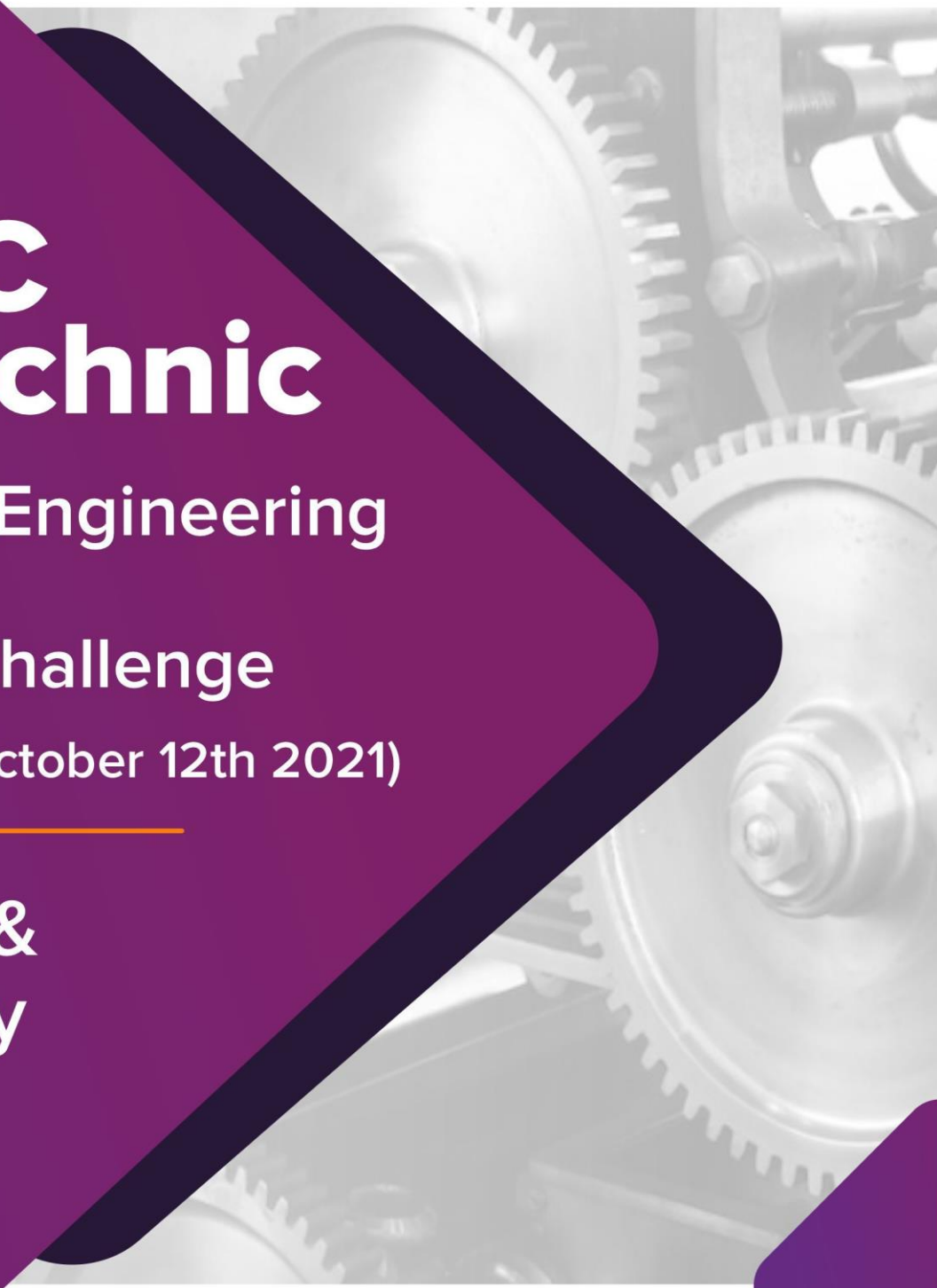
MEGA MOCK CHALLENGE

BYJU'S EXAM PREP



UPPSC Polytechnic

Mechanical Engineering

Mini Mock Challenge

(October 11th - October 12th 2021)

Questions & Answer Key

1. Atmospheric air at 100 kPa & 30°C has the relative humidity of 70%. & its saturation pressure is 4.50 kPa. Then what will be saturation pressure at due point temperature.

A. 4.50 kPa
B. 3.15 kPa
C. 5.22 kPa
D. 2.50 kPa

Ans. B

2. What is the maximum deflection in a cantilever beam carrying a uniformly distributed load of w per unit length? (L-length of the beam, EI- flexural rigidity of the section of the beam)

A. $\frac{wL^4}{3EI}$
B. $\frac{wL^3}{192EI}$
C. $\frac{5wL^4}{384EI}$
D. $\frac{wL^4}{8EI}$

Ans. D

3. For an Ideal Brayton cycle W_{net} = 750 kJ/kg and the back work ratio is 0.45. Then the actual compressor work will be _____.

A. 613.64 kJ/kg
B. 916.67 kJ/kg
C. 1363.64 kJ/kg
D. 1666.67 kJ/kg

Ans. A

4. For a reversible power cycle, the operating temperature limits are 800K and 300K. 400kJ of heat is supplied to this cycle from high temperature source.The unavailable work will be.

A. 250 kJ
B. 150 kJ
C. 120 kJ
D. 100 kJ

Ans. B

5. In a plate clutch, axial force is 8 kN. The inside radius of contact surface is 80 mm and the outside radius is 130 mm. For uniform pressure, the mean radius of friction surface will be___.

A. 105 mm
B. 106 mm
C. 107 mm
D. 108 mm

Ans. C

6. A thin pressure vessel of 300 mm radius and 15 mm thickness is subjected to an internal pressure of 2 Mpa. If the ratio of thickness and diameter is less than 1/15 then find the diameter of the Mohr circle.

A. 10 unit
B. 20 unit
C. 26 unit
D. 30 unit

Ans. B

7. If A_1 and A_2 are the internal and external surface areas of hollow cylinder, the logarithmic mean area is given by _____.

A. $\frac{(A_2 + A_1)}{\ln(A_2 / A_1)}$
B. $\frac{\ln(A_2 / A_1)}{(A_2 + A_1)}$
C. $\frac{(A_2 - A_1)}{\ln(A_2 / A_1)}$
D. $\frac{(A_1 + A_2)}{2}$

Ans. C

8. For obtaining a cup of diameter 25 mm and height 15 mm by drawing, the size of the round blank should be approximately _____.

A. 42 mm
B. 44 mm
C. 46 mm
D. 48 mm

Ans. C

9. Find the tearing efficiency if dia of rivet hole is 8 mm and pitch of rivet is 20 mm ?

A. 0.4
B. 0.8
C. 0.6
D. 0.5

Ans. C

10. An item can be purchased for Rs 100. The ordering cost is Rs. 100 and the inventory carrying cost is 10% of the item cost annum. If the annual demand is 100 units, then economic order quantity (in units) is _____.

A. 45
B. 10
C. 20
D. 35

Ans. A

11. The pressure drop in an 80 cm horizontal pipe is 50 kPa in a distance of 10m. The shear stress(in KPa) at the pipe wall is

A. 0.05
B. 1
C. 0.1
D. 0.4

Ans. B

12. Chemical formula of "R-11" _____.

A. $CHCl_3$
B. CF_3Cl
C. $CFCl_3$
D. CH_3Cl

Ans. C

13. In Rolling Friction "Contact path length" is defined as_____.

A. Difference between inner and outer turning radius.
B. Circumference of one wheel.
C. Distance by which the normal reaction shifts.
D. Distance between wheel centre and ground

Ans. C

14. Radius of small and large pulley are 30 cm and 45 cm respectively. Belt thickness is 12 cm. Velocity ratio of the arrangement in an open drive system is_____.

A. 1.73
B. 1.56
C. 1.41
D. 1.50

Ans. C

15. The structure of Fe_3C in iron carbon diagram is

A. FCC
B. BCC
C. tetragonal
D. orthorhombic

Ans. D

16. The moment of inertia of a flywheel is 500 kg m^2. Starting from rest, it is moving with a uniform acceleration of 0.05 rad/s^2. After 10 seconds from the start, its kinetic energy at end will be:

A. 62.5 Nm
B. 250 Nm
C. 625 Nm
D. 125 Nm

Ans. A

17. The state of stress at a point is: σ_x = 700 MPa, σ_y = 300 MPa and τ_{xy} = 350 MPa. Which combination of maximum principal stress and max. shear stress is correct?

A. $\sigma_{max.}$ = 1000 MPa, $\tau_{max.}$ = 400 MPa
B. $\sigma_{max.}$ = 810.12 MPa, $\tau_{max.}$ = 410.12 MPa
C. $\sigma_{max.}$ = 880.12 MPa, $\tau_{max.}$ = 380.12 MPa
D. $\sigma_{max.}$ = 903.11 MPa, $\tau_{max.}$ = 403.11 MPa

Ans. D

18. The DC power source for arc welding has the characteristics 4V+ I = 240, where V = voltage and I= current in amp for maximum arc power at the electrode voltage should be _____.

A. 20V
B. 30V
C. 50V
D. 60V

Ans. B

19. In a counter flow heat exchanger with effectiveness of 0.75, the properties are flow rate are such that the both fluids have thermal capacity equal to 1000 W/°C. What will be the area of heat exchanger required, if the heat transfer coefficient is 100 W/m^2.°C _____?

A. 40 m^2
B. 30 m^2
C. 20 m^2
D. None of the above

Ans. B

20. Pearlite is a combination of _____.

A. Ferrite and cementite
B. Cementite and gamma iron
C. Ferrite and austenite
D. Ferrite and iron graphite

Ans. A

21. The Biot number can be thought of as the ratio of _____.

A. The conduction thermal resistance to the convective thermal resistance
B. The convective thermal resistance to the conduction thermal resistance
C. The thermal energy storage capacity to the conduction thermal resistance.
D. The thermal energy storage capacity to the convection thermal resistance.

Ans. A

22. For an opaque plane surface the irradiation radiosity and emissive power are respectively 25, 15, and 12 W/m^2. What is the emissivity of the surface?

A. 0.2 B. 0.4

C. 0.77 D. 1.0

Ans. C

23. A square full journal bearing of 100mm diameter is to support a radial load of 50kN at 600rpm. If it is to be operated at a Sommerfeld number of 0.08 with a diametral clearance of 0.4mm, the viscosity of oil in (Pa-s) will be _____.

A. 1.24 B. 2.31

C. 0.64 D. 0.12

Ans. C

24. A circular disk of diameter D, is submerged in water & one of it is edge touches the surface of water. The difference in height of centre of pressure & centre of gravity are_____.

A. $\frac{D}{16}$ B. $\frac{D}{8}$

C. $\frac{D}{2}$ D. $\frac{D}{64}$

Ans. B

25. The relation between Tangential Velocity (v) and radius (r) is given by

A. v/r = Constant for forced vortex

B. v × r = Constant for free vortex

C. Both A and B

D. v × r =Constant for forced vortex

Ans. C

26. A steel rod 10 m long is at temperature of 20℃ and is heated to 60℃. What is the stress induced if the allowable expansion in the rod is 4mm. Young's Modulus of steel is 200 GPa and coefficient of linear expansion is 12×10^{-6}/℃.

A. 16 MPa B. 32MPa

C. -16MPa D. -32MPa

Ans. C

27. Using the following information from a four-bar mechanism, calculate the actual mechanical advantage.

Driving link rotates at 120 rad/s.

Angular velocity of driven link = 84 rad/s

Efficiency of mechanism = 80%

A. 1.06 B. 1.18

C. 1.10 D. 1.14

Ans. D

28. Match List I (Unconventional machining processes) with List II (Energy sources) and select the correct answer using the codes given below the list :

	List-I		List-II
P.	Electric discharge machining	1.	High speed electrons
Q.	Electron beam machining	2.	Powerful radiation
R.	Abrasive jet machining	3.	Electric spark
S.	Laser beam machining	4.	Mechanical/fluid motion

A. P-3 Q-4 R-1 S-2
B. P-2 Q-3 R-1 S-4
C. P-3 Q-1 R-4 S-2
D. P-2 Q-4 R-3 S-1

Ans. C

29. Navier-Stokes equation, Bernoulli's Principle and Continuity equation, respectively work on the principles of conservation of

A. Mass, Energy, and Momentum
B. Energy, Momentum, and Mass
C. Momentum, Energy, and Mass
D. Momentum, Mass and Energy

Ans. C

30. The minimum and maximum volumes in an air standard otto cycle are 100cc and 800cc. Thermal efficiency of the cycle approximately will be

A. 57%
B. 37%
C. 67%
D. 46%

Ans. A

31. Determine the diameter of spherical casting, whose solidification time was found to be 75 min. Take solidification Factor to be 0.97×10^6 s/m^2.

A. 220mm
B. 400 mm
C. 408 mm
D. 512 mm

Ans. C

32. Which property of fluid influences he selection for fluid to be a manometric fluid to be used in barometer _____.

A. high density
B. low compressibility
C. high surface tension
D. low vapor pressure

Ans. D

33. In ABC analysis, the items are rank in descending order on the basis of the _____.

A. usage values
B. cost of one unit
C. holding cost
D. ordering cost

Ans. A

34. Work input factor (ratio of theoretical power to ideal power required) value ranges around _____?

A. 1.06 B. 0.94

C. 1.12 D. 0.89

Ans. A

35. The time period of a vertical conical pendulum is_____.

(Where θ is the angle of wire with vertical and ℓ is the wire length)

A. $2\pi\sqrt{\frac{\ell\cos\theta}{g}}$ B. $2\pi\sqrt{\frac{\ell\sin\theta}{g}}$

C. $2\pi\sqrt{\frac{\ell\tan\theta}{g}}$ D. $2\pi\sqrt{\frac{\ell}{g}}$

Ans. A

36. Match Column I with Column II.

Column I	Column II
1) Inexact Differential	A) Kinetic Energy
2) Pure Substance	B) Work
3) Rarefied Gas Theory	C) Gaseous Mixture of O_2 & N_2
4) Temperature	D) Microscopic Approach

A. 1-B 2-C 3-D 4-A B. 1-C 2-B 3-A 4-D

C. 1-C 2-A 3–D 4-B D. 1-B 2–D 3–C 4-A

Ans. A

37. A gas is following under walls equation undergoes a constant temperature expansion from volume V_1 to V_2. Find the work done by the gas following $\left(P+\frac{a}{V^2}\right)(V-b)=mRT$ is given as:

A. $mRT\ln\left(\frac{V_2+b}{V_1+b}\right)+a\left[\frac{1}{V_2}-\frac{1}{V_1}\right]$

B. $mRT\ln\left(\frac{V_2-b}{V_1-b}\right)+\frac{1}{a}\left[\frac{1}{V_2}-\frac{1}{V_1}\right]$

C. $mRT\ln\left(\frac{V_2-b}{V_1-b}\right)+a\left[\frac{1}{V_2}-\frac{1}{V_1}\right]$

D. $mRT\ln\left(\frac{V_2+b}{V_1+b}\right)+\frac{1}{a}\left[\frac{1}{V_2}-\frac{1}{V_1}\right]$

Ans. C

38. If first and last gear having teeth 40 and 50 respectively of a simple gear train, what will be the train value and speed ratio respectively if first gear is driving gear

A. 4/5 and 5/4 B. 3/5 and 4/5

C. 5/3 and 3/5 D. 4/5 and 3/5

Ans. A

39. What is the optimum tool life for maximum productivity ,if the tool change time is 2 min and tool index (n) is 0.2 ?

A. 6 min. B. 4 min.

C. 8 min. D. 12 min.

Ans. C

40. In a grinding wheel designation given by A 50 G 8 B 23, 'B' stands for _____.

A. Rubber bond B. Shellac bond

C. Resinoid bond D. Silicate bond

Ans. C

41. For a PERT network, the optimistic time estimate, most likely time estimate and the pessimistic time estimates of an activity are 9 days, 11 days and 19 days respectively, the expected time of completion of the activity as per beta distribution is:

A. 11 days B. 19days

C. 14 days D. 12 days

Ans. D

42. An inventor claims to have designed a heat engine which absorbs 1500 kJ and 150 kJ of energy as heat from reservoir at 1000 K and 300 K respectively and rejects 600 kJ energy as heat to reservoir at 600 K. It delivers 1050 kJ work. Judge whether the claim is acceptable or not.

A. Acceptable B. rejectable

C. cannot say D. data insufficient

Ans. B

43. Match the following:

Types of pair :

P) Revolute

Q) Cylindrical

R) Spherical

Degree of constraint :

1) 3

2) 5

3) 4

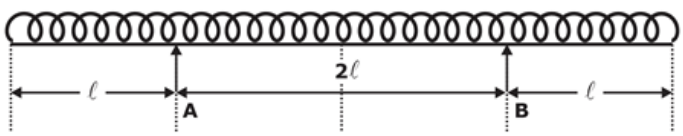
4) 2

A. P-1 Q-3 R-2 B. P-2 Q-4 R-3

C. P-2 Q-3 R-1 D. P-4 Q-1 R-3

Ans. C

44. A simply supported beam, overhung each side carries uniformly distributed load as shown in figure. Choose correct option for bending moment diagram (BMD).



A. 

B. 

C. 

D. 

Ans. D

45. What will be the interplanar spacing for BCC iron having (2 2 0) set of planes. The lattice parameter for Fe is 0.2828 nm

A. 10 A°
B. 0.1 A°
C. 0.2 A°
D. 1 A°

Ans. D

46. वीभत्स रस का स्थायी भाव है।

A. शांत
B. विस्मय
C. निर्वेद
D. जुगुप्सा

Ans. D

47. उपमा अलंकार के कितने अंग होते है?

A. 2
B. 3
C. 4
D. 5

Ans. C

48. "**गृहागत**" शब्द में समास है।

A. कर्म तत्पुरुष समास
B. करण तत्पुरुष समास
C. संप्रदान तत्पुरुष समास
D. अपादान तत्पुरुष समास

Ans. A

49. **निर्देश:** निम्नलिखित दिए गए शब्दो में से पर्यायवाची शब्द का चयन करे।

व्योम

A. गगन
B. भूषण
C. श्यामा
D. भूतल

Ans. A

50. 'चपल' शब्द का उचित विलोम चुनिए –

A. महान
B. गंभीर
C. स्थिर
D. गतिशील

Ans. C

51. निम्न में से कौन सा शब्द तत्सम है –

A. माँ
B. चाँद
C. शेर
D. चन्द्र

Ans. D

52. **निर्देश:** नीचे लिखे वाक्य के लिए एक शब्द बताइए ।

एक व्यक्ति द्वारा चलायी जाने वाली शासन प्रणाली

A. नौकरशाही
B. राजतंत्र
C. प्रजातांत्रिक
D. तानाशाही

Ans. D

53. **निर्देश:** दिए गए मुहावरे का सही अर्थ विकल्पों में से चुनिए ।

कफन सिर पर बंधना

A. मरने के लिए तैयार रहना
B. लडाई करना
C. सर मुडवाना
D. कठिन काम करना

Ans. A

54. निर्देश: वर्तनी के अनुसार शुद्ध शब्द का चयन कीजिएः

A. फूर्तीला
B. फुर्तीला
C. फुर्तिला
D. फुरतीला

Ans. B

55. **निर्देश:**नीचे दिए गए प्रत्येक प्रश्न में शब्दों का एक समूह मोटे अक्षरों में लिखा गया है दिए गए विकल्पों में से उस विकल्प का चयन कीजिए जो की वाक्य में मोटे अक्षरों की जगह ले ले । यदि कोई विकल्प मोटे अक्षर की जगह नहीं ले सकता तो उत्तर संशोधन आवश्यक नहीं विकल्प होगा ।

नौकर के हाथ से प्याला गिरा और मालकिन **अंगार बन गयी**।

A. पीटने लगी
B. क्रोध में चिल्लाने लगी
C. मुस्कुराने लगी
D. पश्चाताप करना

Ans. B

56. नि:शुल्क शब्द में कौन सी सन्धि है ?

A. विसर्ग सन्धि
B. व्यंजन सन्धि
C. स्वर सन्धि
D. यण सन्धि

Ans. A

57. निम्नलिखित दिये हुये शब्दो में से पुल्लिंग शब्द कौन सा है ?

A. कुरसी
B. छड़ी
C. खटमल
D. देवनागरी

Ans. C

58. वचन बदलिए: एक ऋषि, दस..

A. ऋषि
B. ऋषियें
C. ऋषियाँ
D. ऋषिओं

Ans. A

59. "राम ने रावण को मारा" वाक्य में कौन-सा कारक है ?

A. करण कारक
B. कर्ता कारक
C. कर्म कारक
D. अपादान कारक

Ans. C

60. **निर्देश:** नीचे लिखे वाक्य के लिए एक शब्द बताइए।

'जो कल्पना से परे हो'

A. काल्पनिक
B. असम्भव
C. कल्पनातीत
D. च्युत

Ans. C

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