X

Question Paper with Final (Revised) Answer Key for the Post of

Assistant Engineer (Mechanical)

held on 26-07-2018

Itemcode: AE1001

Q1: Two forces P and Q are acting at an angle α . The resultant force R acts at an angle of θ with force P, then the value of θ will be

- $\mathbf{A} \qquad \tan^{-1} \frac{Q \cos \alpha}{P + Q \cos \alpha}$
- $\mathbf{B} \qquad \tan^{-1} \frac{Q \sin \alpha}{P + Q \cos \alpha}$
- $c \tan^{-1} \frac{Q \cos \alpha}{P + Q \sin \alpha}$
- $\int_{\mathbf{D}} \tan^{-1} \frac{Q \sin \alpha}{P + Q \sin \alpha}$

Correct Ans: B

Itemcode: AE1002

Q2: The moment of the force about a point is equal to the algebraic sum of the component forces about the same point is known as

- A Tresca theory
- **B** Law of Parallelogram
- c Law of triangle
- **D** Varignon's theorem

Correct Ans: **D**

Itemcode : AE1003

Q3: Three forces P, Q, and R are acting concurrently. The included angles are α , β , and Υ . According to Lami's theorem

- $\mathbf{A} \qquad \frac{P}{\sin \alpha} = \frac{Q}{\sin \beta} = \frac{R}{\sin \gamma}$
- $\mathbf{B} \quad \frac{P}{\cos \alpha} = \frac{Q}{\cos \beta} = \frac{R}{\cos \gamma}$
- $\mathbf{c} \quad \frac{P}{\tan \alpha} = \frac{Q}{\tan \beta} = \frac{R}{\tan \gamma}$
- $\mathbf{D} \quad \frac{\sin \alpha}{P} = \frac{\sin \beta}{Q} = \frac{\sin \gamma}{R}$

Correct Ans: A

Itemcode: AE1004

Q4: If the angle of wrap in belt drive is θ and the coefficient of friction between belt and pulley is μ . (Where T_1 and T_2 are the tensions in the tight and slack side of the belt respectively.) Which one is true

- $\mathbf{A} \qquad T_1.T_2 = e^{\mu\theta}$
- $\mathbf{B} \qquad \frac{T_2}{T_1} = e^{\mu\theta}$
- $\mathbf{C} \qquad T_1 T_2 = e^{\mu\theta}$

D

	$\frac{T_1}{T_2} = e^{\iota\vartheta}$			
Co	orrect Ans: D			_

Itemcode : AE1005
Q5: The radius of a Mohr's circle represents

A Maximum normal stress

B Minimum normal stress

C Maximum shear stress

D Minimum shear stress

Correct Ans: C

Itemcode : AE1008
Q8: The area under the stress-strain diagram up to the rupture point is known as

A Proof resilience
B Modulus of toughness
C Modulus of elasticity
D Modulus of resilience

Correct Ans: B

| Itemcode : AE1009
| Q9: A cantilever beam of length L is subjected to a uniformely distributed load W per unit length. The maximum bending moment will be equal to
| A | WL | 2 |
| B | WL² | 2 |

С	$\frac{WL^2}{4}$		
D	$\frac{WL^2}{8}$		
Cor	rrect Ans: B		
	Itemcode: AE1010		
Q1	Q10: The variation of bending stress in a curved beam isin nature.		
A	Linear		
В	Cubic		
С	Parabolic		

Itemcode: AE1011
Q11: Indenter used in Brinell Hardness test is

A Square base pyramid diamond
B Rectangular based pyramid diamond
C Sphare made of steel or tungsten carbide
D Spero conical diamond
Correct Ans: C

D HyperbolicCorrect Ans: **D**

Itemcode: AE1012
Q12: Atoms are arranged in face centered cubic (FCC) structure as

A | All eight corners of the cube
B | All eight corners of the cube and one at the body center

C | All eight corners of the cube and at the center of each face

D | All eight corners of the cube and one at the body center with one at the center of each face

Correct Ans: C

| Itemcode : AE1015 |
| Q15: Decreasing the clay content in the moulding sand increases the |
| A | Permeability |
| B | Refractoriness |

С	Green strength				
D	Flowability				
Cor	rrect Ans: A				
	mcode: AE1016 6: Refractoriness of the moulding sand can be increased by				
A	Increasing the grain size				
В	Decreasing the grain size				
С	Increasing the water content				
D	Increasing the clay content				
Cor	rrect Ans: A				
	mcode: AE1017 7: Chills are used in the casting to				
A	Provide the support to the core				
В	Improve the directional solidification				
С	To cool the mould rapidly after casting				
D	To connect the poring basin and runner				
Cor	rrect Ans: B				
Thou	mcode : AE1018				
	8: Which of the following generally has square cross section				
A	Ingot				
В	Bloom				
С	Slab				
D	Billet				
Cor	rrect Ans: D				
	mcode: AE1019 9: Molten glass is used as lubricant in				
A	Rolling				
В	Wire Drawing				
С	Deep drawing				
D	Forward hot extrusion				
Cor	rrect Ans: D				
	Itemcode : AE1020				
	0: In the sheet metal operations shear stress is induced in				
Α	Blanking				
В	Punching				
С	Trimming				
D	All of the above				
Cor	rrect Ans: D				
	n <u>code</u> : AE1021 1: Polarity change is required in				
Α	AC welding				
В	DC Welding				
С	Both AC and DC welding				
D	Neither AC nor DC welding				

Correct Ans: B Itemcode : AE1022 Q22: Consumable electrode is used in A Gas metal arc welding Carbon arc welding c Resistance welding D Hydrogen gas welding Correct Ans: A Itemcode : AE1023 Q23: Arc blow problem occurs in A Oxy-acetylene welding **B** AC welding DC welding Electron beam welding Correct Ans: C Itemcode: AE1024 Q24: A flexible plastic bottle is manufactured by A Injection moulding Thermoforming **c** Extrusion Blow moulding Correct Ans: **D** <u>Itemcode</u>: **AE1025** Q25: The Merchant circle is used to A Improve the quality of a product **B** Find the principal stress and principal strain **c** Fix the price of a product in the market **D** Establish the shear angle relationship in machining Correct Ans: D Itemcode : AE1026 Q26: The surface finish of a cylindrical hole is maintained by A Honing Lapping c Internal cylindfrical grinding Correct Ans: A Itemcode: AE1027 **Q27:** In shaping process A Tool reciprocates and feed is given to job Job reciprocates and feed is given to tool Both tool and job reciprocate relative to each other **D** Both tool and job remain static. Correct Ans: A

Itemcode: AE1028

Q2	228: Knurling operation is performed on		
A	Shaper machine		
В	Milling machine		
С	Grinding machine		
D	Lathe machine		
Cor	Correct Ans: D		

Itemcode : AE1031	Q31: A pick and place arm of a robot is
A	The most flexible of all robots
B	An intelligent robot
C	Capable of point to point operation
D	Primarily used for large parts handling
Correct Ans: C	

Itemcode: AE1032
Q32: In an assembly line balancing, 4 tasks with time 15, 18, 13, 21 min are to be assigned on the different workstations for the cycle time 25 min. The theoretical and actual number of workstations required are

A 3 and 4 respectively
B 4 and 5 respectively
C 3 and 5 respectively
C 2 and 3 respectively
Correct Ans: A

| Itemcode : AE1033 |
| Q33: Which layout is most suitable for highest flexibility |
A	Product layout
B	Process layout
C	Fixed position layout
D	Group layout
C	Correct Ans: D

Itemcode : AE1034
Q34: Delphi technique is used in
A Forecasting

В	Inventory management	
С	Quality planning	
D	Material handling	
Cor	rect Ans: A	
	ncode: AE1035 To meet the weekly fluctuating demand of the customer	
A	Material requirement planning can be used	
В	Economic order quantity can be used	
C	Aggregate production planning can be used	
D	Master production schedule can be used	
Cor	rect Ans: C	
Iter	ncode : AE1036	
Q3	5: Just-in-Time concept was developed by	
Α	Taiichi Ohno	
В	Kiichito Toyoda	
С	Eiji Toyoda	
D	Demin	
Cor	rect Ans: A	
	ncode: AE1037 7: W. A. Shewart introduced the concept of	
Α	Control chart	
В	Travel chart	
С	Sampling plan	
D	Quality circle	
Cor	rect Ans: A	
	n <u>code</u> : AE1038 3: Which one is used as control chart for variables	
A	X-bar and R chart	
В	P- Chart	
С	C- Chart	
D	U-Chart	
Cor	rect Ans: A	
$\frac{\text{Itemcode}}{\mathbf{Q39:}}: \text{ If the value of } \text{$\int \frac{dQ}{T}$ is greater than zero, the nature of the thermodynamic cycle is}$		
Α	Reversible	
В	Irreversible	
С	Both reversible and irreversible	
D	Impossible	
Correct Ans: D		
	ncode: AE1040 D: Specific heat at constant pressure can be given as (Where Y is ratio of specific heats at constant pressure and constant volume, R is a gas constant, J is the Joule constant.)	
A		

	$\frac{\gamma R}{J(\gamma-1)}$
В	$\frac{JR}{\gamma(\gamma-1)}$
С	$\frac{\gamma R}{J(R-1)}$
D	$\frac{R}{J(\gamma-1)}$
Cor	rect Ans: A

| Itemcode : AE1041 | Q41: Internal energy of a system containing perfect gas depends on | A | Pressure only | B | Temperature only | C | Pressure and temperature | D | Pressure temperature and specific heat | Correct Ans: B

Itemcode: AE1043
Q43: Which of the following law governs the isothermal process

A Boyle's Law

B Charle's law

C Joule's law

D Gay Lussac's law

Correct Ans: A

Itemcode: AE1044
Q44: Liquified Petroleum Gas is a mixture of

A Propane and butane
B Propane and ethane
C Methane and isopropane
D Butane and entane

Correct Ans: A

 Itemcode : AE1045

 Q45: Which of the following is not a renewable source of energy

 A
 Solar energy

 B
 Wind energy

 C
 Natural gas

 D
 Tidal energy

 Correct Ans: C

Itemcode: AE1046 Q46: Superheating of the steam is done at					
A	Constant temperature				
В	Constant volume				
С	Constant pressure				
D	Constant entropy				
Coi	rrect Ans: C				
_	mcode: AE1047 7: To maximize the efficiency, the speed ratio in Parson's reaction turbine is				
A	$\frac{\cos \alpha}{2}$				
В	$\frac{\cos^2 \alpha}{2}$				
С	$\cos \alpha$				
D	$\cos^2 \alpha$				
Co	rrect Ans: C				
	mcode : AE1048 8: Generally, which type of compressor is used in a gas turbine				
A	Reciprocating				
В	Centrifugal				
С	Axial flow				
D	Lob type				
Coi	rrect Ans: C				
	mcode: AE1049 9: Compression ratio in SI engine varies from				
A	6 to 10				
В	10 to 14				
С	14 to 22				
D	22 to 32				
Coi	rect Ans: A				
	mcode: AE1050 O: Morse test is conducted on				
A	Single cylinder engine				
В	Multi-cylinder engine				
С	Steam engine				
D	Gas turbine				
Coi	Correct Ans: B				
	mcode : AE1051 1: The total heat radiation from a black body per second per unit area is proportional to (Where T is an absolute temperature.)				
A	T^4				
В	T^3				
С	T^2				

D T
Correct Ans: A

| Itemcode : AE1054 | Q54: For the medium head of the water (24 – 180 m), which hydraulic turbine is best suited | Pelton turbine | Francis turbine | Francis turbine | C | Kaplan Turbine | Any one | Correct Ans: B

 Itemcode: AE1056

 Q56: Power need to drive the centrifugal pump is proportional to

 A
 N

 B
 N^2

 C
 N^3

 D
 $N^{3/2}$

 Correct Ans: C

Itemcode : AE1057
 Q57: Euler's equation in the differential form can be expressed as (Where dP is the pressure difference, ρ is the density of the fluid, v is the velocity, dz is the differential head, g is the gravitational acceleration.)
 P v²

В	$\frac{dP}{\rho} + vdv + gdz = 0$
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$$\mathbf{c} \quad \frac{d\rho}{\rho} + vdv + gdz = 0$$

$$\frac{d\rho}{P} + vdv + gdz = 0$$

Correct Ans: B

<u>Itemcode</u>: **AE1058**

 $\textbf{Q58:} \quad \text{If ϵ is the clearance ratio for a reciprocating compressor, the volumetric efficiency will be equal to} \\$

$$\mathbf{A} \qquad 1 - \varepsilon \left(1 + r^{\frac{1}{n}} \right)$$

$$\mathbf{B} \qquad 1 + \varepsilon \left(1 - r^{\frac{1}{n}} \right)$$

c
$$1+\varepsilon \left(1-\frac{1}{r^n}\right)$$

$$\mathbf{D} = 1 - \varepsilon \left(1 - \frac{1}{\frac{1}{r^n}} \right)$$

Correct Ans: B

<u>Itemcode</u>: **AE1059**

Q59: In the axial flow compressor, the efficiency can be maximized by

- **A** Increasing the speed
- **B** Decreasing the speed
- c Maintaining the speed constant and moderate
- **D** None of these

Correct Ans: A

<u>Itemcode</u>: **AE1060**

Q60: Poisson ratio is expressed as

- A Lateral stress/lateral strain
- **B** Longitudinal stress/ longitudinal strain
- c Lateral strain/ longitudinal strain
- D Lateral stress by longitudinal stress

Correct Ans: C

Itemcode : AE1061

Q61: The value of poisson ratio for steel ranges from

- **a** 0.25 to 0.33
- **B** 0.33 to 0.5
- **c** 0.5 to 0.8
- **D** 0.8 to 1.2

Correct Ans: A

Itemcode : AE1062

Q62:

	If the helix	and friction angles in a screw jack are given as α and ϕ respectively, the value of coefficient of friction, μ will be
A	$\frac{\tan\alpha}{\tan\left(\alpha+\phi\right)}$	
В	$\frac{\tan\left(\alpha+\phi\right)}{\tan\alpha}$	
С	$\frac{\tan\left(\alpha-\phi\right)}{\tan\left(\alpha+\phi\right)}$	
D	$\frac{\tan\left(\alpha+\phi\right)}{\tan\left(\alpha-\phi\right)}$	
Cor	rect Ans: S	(S Denotes question scrapped and weight-age to all)

| Itemcode : AE1063 |
| Q63: Which of the following is the dead weight governor |
A	Porter Governor
B	Watt Governor
C	Hartung Governor
D	Hartnell Governor
Correct Ans: A	

Itemcode: AE1065
Q65: The included angle in the V-belt drive ranges from

A 15° to 30°
B 30° to 45°
C 45° to 60°
D 60° to 90°

Correct Ans: B

С	Key
D	Shaft
Correct Ans: C	

 Itemcode : AE1068

 Q68: For a new clutch, the friction radius is equal to (Where D and d is the external and internal diameter respectively.)

 A
 $\frac{1}{3} \frac{D^3 - d^3}{D^2 - d^2}$

 B
 $\frac{2}{3} \frac{D^3 - d^3}{D^2 - d^2}$

 C
 $\frac{D+d}{4}$

 Correct Ans: A

 $\begin{array}{ll} \underline{\textbf{Itemcode}}: \textbf{AE1069} \\ \textbf{Q69:} & \textbf{For a block brake, the equivalent coefficient of friction is} \\ & (\textbf{Where 20 is the angle of contact and } \mu \textbf{ is the coefficient of friction.}) \\ \textbf{A} & \frac{2\sin 2\theta}{2\theta + \sin 2\theta} \mu \\ \textbf{B} & \frac{4\sin \theta}{2\theta + \sin 2\theta} \mu \\ \textbf{C} & \frac{4\sin 2\theta}{2\theta + \sin 2\theta} \mu \\ \textbf{D} & \frac{2\sin \theta}{2\theta + \sin 2\theta} \mu \\ \hline \textbf{Correct Ans: B} \\ \end{array}$

Itemcode : AE1070Q70: The relationship between the guage length (L) and the cross sectional area (A) of the test specimen in a tensile testing is given byA $L = 5.65\sqrt{A}$ B $A = 5.65\sqrt{L}$ C $L = 8.65\sqrt{L}$ Correct Ans: A

Itemcode : AE1072

Q7	2: Sine bar is used to measure the		
A	Slope of the surface of a workpiece		
В	Diameter of a job		
С	Thickness of a job		
D	Length of a job		
Cor	rect Ans: A		
<u>Ite</u>	mcode : AE1073		
Q7	3: An exact centering can be done on a lathe by		
A	Four jaw chuck		
В	Three jaw chuck		
С	Dog clutch		
D	Face plate		
Cor	rrect Ans: A		
Itor	<u>mcode</u> : AE1074		
	4: The ratio of aluminium and iron oxide used in thermit welding is		
A	1:3		
В	3:1		
С	1:2		
D	2:1		
Cor	rrect Ans: A		
71	words a APACTE		
	ncode: AE1075 5: In a oxy-acetylene welding, the ratio of oxygen to acetylene in reducing flame is		
Α	0.5:1		
В	0.9:1		
С	1:1.2		
D	1:1.5		
Cor	rrect Ans: B		
	mcode: AE1076 6: Seamless tube can be made by		
A	Rolling		
В	Die forging		
С	Piercing		
D	Extrusion		
	rect Ans: C		
COI	Tecc Alls. C		
	Itemcode : AE1077 Q77: The tool material used in electro-discharge machining is		
A	Aluminium		
В	Steel		
С	Diamond		
D	Copper or brass		
Cor	rect Ans: D		
Iter	Itemcode: AE1078		
	Q78: The atmosphere required in the furnace for nitriding the steel component is of		
A	Liquid nitrogen		

В	Nascent nitrogen			
С	Ammonia			
D	Graphite			
Cor	rrect Ans: C			
	ncode: AE1079 9: Flame and induction hardening process is used for			
A	A big job			
В	Small portion of a job			
С	Deeper hardness of a job			
D	Inner hardness of a job			
Cor	rect Ans: B			
	ncode : AE1080 D: Negative rake angle is used in			
A	High carbon steel tool			
В	Ceramic tool			
С	Super steel			
D	Cubic boron nitride tool			
	rect Ans: B,D			
	ncode: AE1081			
	1: How many reserved Assembly constituencies are there in Kangra District of H.P. ?			
A B	Two			
	Three Four			
C D	Five			
	rect Ans: B			
00.	Total District Distri			
	mcode : AE1082			
	2: Which mountain pass joins Lahaul and Spiti areas of H.P. ?			
Α	Kunzam			
В	Baralacha			
C	Kugti			
D	Padri Padri Ana A			
Coi	Correct Ans: A			
<u>Iter</u>	Itemcode: AE1083			
Q8:	3: In which district of H.P. is Mahakali lake ?			
A	Kullu			
В	Kinnaur			
С	Lahaul - Spiti			
D	Chamba			
Cor	Correct Ans: D			
<u>Ite</u> r	Itemcode: AE1084			
	Q84: In which district of H.P. Dudhon Glacier ?			
Α	Kangra			
В	Kinnaur			
С	Lahaul - Spiti			

Kullu Correct Ans: D Itemcode : AE1085 Q85: Which one of the following temples is built in Pagoda style? Hadimba (Manali) В Shakti Devi (Chhitrari) C Hateshwari (Hatkoti) Lakshna Devi (Bharmour) Correct Ans: A Itemcode : AE1086 Q86: Near which town of Shimla District is Sipi Fair celebrated in May ? Rohru Chopal С Mashobra **D** Rampur Correct Ans: C Itemcode : AE1087 **Q87:** Which NGO petitioned against unauthorised construction of Hotels including the one by H.P. Tourism Development Corporation? **A** KPA В SPOKE С NGT INTACH Correct Ans: B Itemcode : AE1088 Q88: When was the H.P. Territorial Council converted into Legislative Assembly ? 1961 В 1962 С 1963 1964 Correct Ans: C Itemcode : AE1089 **Q89:** Near which town of H.P. is Baba Balku Museum ? Shah Talai Badsar С Shimla D Solan Correct Ans: C <u>Itemcode</u>: **AE1090** Q90: Which Himachali is the author of novel Ramta Jogi? Sunder Lohia Yogeshwar Sharma Om Prakash Sarswat Hari Ram Jasta Correct Ans: D

Itemcode: AE1091
Q91: From which Assembly constituency of Karnataka did K. Siddaramaiah contest during the 2018 Assembly Elections?

A Kanakpura
Kollegal
C Badami
Krishnaraja

Correct Ans: C

Itemcode: AE1095
Q95: According to Swachh Sarvekshan 2018 which is the cleanest city in India?

A Bhopal
B Chandigarh
C Pune
D Indore
Correct Ans: D

Itemcode: AE1096
Q96: Which country is hosting the fifth Asian Champions Trophy Women Hockey Tournament in May 2018?

A China
B Japan
C South Korea

D Malaysia

Correct Ans: C

<u>Itemcode</u>: **AE1097 Q97:** Which day is observed as International Nurses Day ?

A	5th May
В	12th May
С	19th May
D	23rd May
Correct Ans: B	

Itemcode: AE1099
Q99: In which country is Kaaba, the inner shrine of mosque at Mecea?

A Saudi Arabia

B Kuwait

C Dubai

D Iraq

Correct Ans: A