

الاسم الرباعي:
الرقم السري:

جامعة تكريت
كلية الهندسة
قسم الهندسة الميكانيكية

الوقت: ثلاث ساعات

الرقم السري:

الامتحان التنافسي لتقديم للدراسات العليا
للعام الدراسي 2023/2022
(الماجستير)
يوم الاثنين المصادف 16 / 5 / 2202

ملاحظات:

- 1- ضع دائرة حول الاجابة الصحيحة للأسئلة الاختيارية.
- 2- الاسئلة من 1-20 لها درجتان لكل سؤال، والاسئلة 21-40 لها ثلاث درجات لكل سؤال.
- 3- الأسئلة من 1-20، اختر الإجابة الصحيحة. الأسئلة من 21-40، املأ الفراغات

لجنة الدراسات العليا
قسم الهندسة الميكانيكية



الامتحان التنافسي للتقديم للدراسات العليا للعام الدراسي 2023-2022

رقم السؤال	الاجابة	الدرجة	رقم السؤال	الاجابة	الدرجة
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
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16			36		
17			37		
18			38		
19			39		
20			40		
الدرجة النهائية		رقما	كتابة		التوقيع



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- 1- Depending on gamma function, the evaluation of the integral $(\int_0^{\infty} e^{-2x} x^3 dx)$ is
 - a. $\frac{\Gamma(4)}{2^4}$
 - b. $\Gamma(4)$
 - c. $\frac{\Gamma(3)}{2^3}$
 - d. $\frac{\Gamma(3)\Gamma(4)}{\Gamma(2)}$
- 2- The differential equation $\frac{\partial^2 u}{\partial x^2} + u \frac{\partial^2 u}{\partial y^2} + \frac{\partial u}{\partial y} = 5$ is:
 - a. Second order nonlinear ordinary differential equation.
 - b. First order non-linear ordinary differential equation.
 - c. Second order linear partial differential equation.
 - d. Second order non-linear partial differential equation
- 3- In the polytropic process equation $\mathbf{pv}^n = \mathbf{constant}$, if $n=0$, the process is termed as
 - a. Isochoric
 - b. Isobaric
 - c. Isothermal
 - d. Adiabatic
- 4- On a temperature – entropy diagram, the area under the reversible process curve represents:
 - a. The heat transfer
 - b. The work done
 - c. The entropy change
 - d. The output power



5- Rankine cycle efficiency of a good steam power plant may be in the range of:

- a. 15 to 20 %
- b. 35 to 45 %
- c. 70 to 80 %
- d. 90 to 95 %

6- Which of the following is the basic principle of fluid mechanics?

- a. Momentum principle
- b. Energy equation
- c. Continuity equation
- d. All above

7- The flow is called turbulent at:

- a. High viscosity of fluid
- b. High velocity of fluid
- c. High density of the fluid
- d. Reynolds number exceeding the transient range

8- Which of the following heat flow situations pertains to free or natural convection?

- a. Cooling or heating air in air conditioning systems like window and split.
- b. Heating room by fin oil heater.
- c. Cooling of internal combustion engine.
- d. Flow of water inside the condenser tubes.

9- In heat dissipation from an infinitely long fin, the boundary conditions are

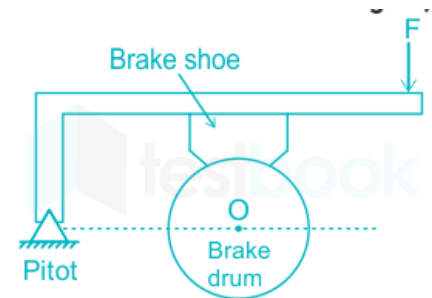
- a. $T(x) = T_{\infty}$ at $x = \infty$ and $T(x) = T_b$ at $x = 0$
- b. $T(x) = T_L$ at $x = 0$ and $T(x) = T_b$ at $x = L$
- c. $T(x) = T_b$ at $x = L$ and $T(x) = T_{\infty}$ at $x = 0$
- d. $T(x) = T_b$ at $x = L$ and $T(x) = T_{\infty}$ at $x = \infty$

10- The included angle in Acme thread is:

- a. 60°
- b. 55°
- c. 47.5°
- d. 29°

11- For the brake shown in the figure which is true

- a. Self-energizing for clockwise rotation of the drum
- b. Self-energizing for anti-clockwise rotation of the drum
- c. Self-energizing for rotation in either direction of the drum
- d. Not a Self-energizing type

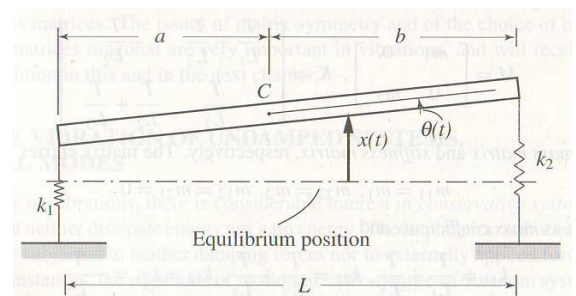


12- In which condition the axial distance between two adjacent coils is called as pitch?

- a. Compressed condition
- b. Uncompressed condition
- c. Both a & b
- d. None of the above

13- The system shown in Figure is

- a. Single degree of freedom
- b. Two degree of freedom
- c. Multi degree of freedom
- d. Infinite degree of freedom



14- The damper element in the forced vibratory system tends to

- a. The response lag the excitation.
- b. The excitation lag the response
- c. The excitation and the response are in phase.
- d. None of above

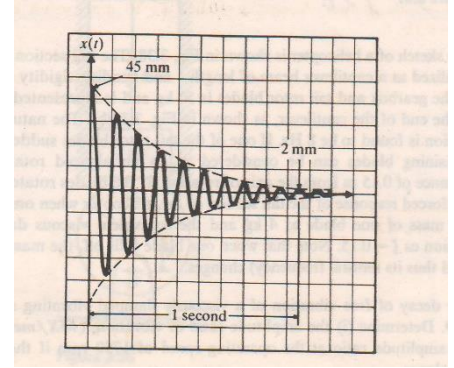


15- The response of vibratory system to rotating unbalance is

- a. Harmonic
- b. Random
- c. Transient
- d. None of above

16- The decay of free vibration of a viscously damped vibrating system is shown in Figure. Then the damped natural frequency ω_d of the system is

- a. 68.2 rad/s
- b. 62.8 rad/s
- c. 31.4 rad/s
- d. 34.1 rad/s



17- For successful extrusion the metal should be

- a. Ductile
- b. Malleable
- c. Plastic
- d. Tough

18- The fatigue resistance of a material is reduced by

- a. permanent residual compressive stress
- b. a mean positive (tensile test)
- c. chemically or mechanically hardening of the surface
- d. poor surface finish

19 - يكون عرض المنطقة المتأثرة بالحرارة أعلى في طريقة لحام:

أ- TIG

ب- MIG

ت- الاوكسي استليني

ث- البلازما



20- يتطلب البثق الخلفي (غير المباشر) قوى أقل مما يتطلبه البثق الأمامي (المباشر) لأن:

أ. المعدن ينساب بعكس اتجاه القوة في البثق الخلفي.

ب. المدك يكون أجوف في البثق الخلفي.

ت. عدم وجود حركة نسبية بين الخامة والحاوية في البثق الخلفي.

ث. تحقق حالة اجهادات انضغاطية ثلاثية الاتجاه في البثق الامامي.

21- The Laplace transform of $\int_0^t e^{-3x} \cos(4x) dx$ is

22- if $\mathbf{a} = 4\mathbf{i} + 3\mathbf{j} + 7\mathbf{k}$ and $\mathbf{b} = 2\mathbf{i} + 5\mathbf{j} + 4\mathbf{k}$, then the cross product of $\mathbf{a} \times \mathbf{b}$ is equal.....

23- The rectangular equation of the polar equation $4r \cos \theta + r \sin \theta = 8$ is.....

24 - A heat engine receives heat at the rate of 1500 kJ/min and gives an output of 8.2 kW.
The thermal efficiency is.....and the rate of heat rejected is.....

25- For closed system, the Non-Flow Energy Equation (N.F.E.E) reduced to.....

26- Bernoulli's Equation is the ideal form of the.....

27- water ideally flows through a pipe of radius 6 cm at a rate of 5 m/s. the pipe then narrows to a radius of 2 cm. the new velocity of the water is.....

28- Venturi relation is one of the applications of.....

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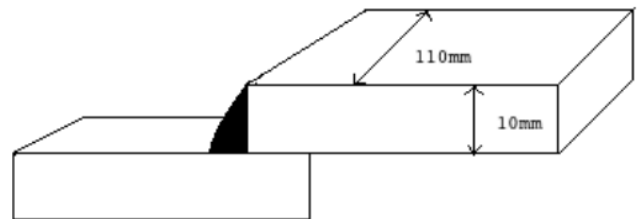
29- A hot fluid enters the counter flow heat exchanger at 100°C and leaves at 60°C . A cold fluid enters the heat exchanger at 40°C and leaves at 60 . Therefore, the Log Mean Temperature Difference for the heat exchanger equal to

30- The Biot number is the ratio of

31- In flow inside pipes, the flow after the entrance length called.....

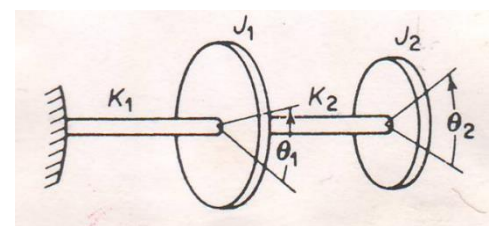
32- The expected life of a ball bearing subjected to a load of 9800 N and working at 1000 rpm is 3000 hours , then the expected life of the same bearing for a similar load of 4900 N and speed of 2000 rpm is.....

33- For the welded joint shown beside, when 70 MPa is the allowable shear stress for the weld material, then the strength of the welded joint will equals



34- Find the stiffness matrix of the system shown in Figure.

.....



35-is the metal which is the best conductor of electricity.

36- A semiconductor has electron concentration of $3 \times 10^{18}/\text{M}^3$, drift velocity 100 m/s , electric field of 500 V/m and electron charge $1.602 \times 10^{-19}\text{ C}$. The conductivity is.....



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37- The advanced materials can be classified to:

- 1.....2.....3.....
.....4.....

38- تستخدم عمليات الدرفلة rolling في إنتاج

39- الاصلاد الانفعالي يصاحب التشكيل.....

40- تكون حركة القطع الرئيسية دورانية مستمرة تقوم بها عدة القطع وحركة التغذية خطية مستمرة تقوم بها قطعة العمل في عملية