University of Mumbai Examination 2021 under cluster 8 (Lead College: PHCET)

Examinations Commencing from 16th June 2021 to 28th June 2021

Program: Automobile Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: AEC501 and Course Name: Internal Combustion Engine

Time: 2 hour

Max. Marks: 80

| 1. Scavenging process is carried out during stroke. in 2 | |
|-------------------------------------------------------------------------------------|----------|
| 1. Scavenging process is carried out during stroke, in 2 | |
| 1 1. 1 Stavenging process is carried out during shoke. If Z | stroka |
| angina | suoke |
| Option A: suction | |
| Option B: compression | |
| Option C: expansion | |
| Option D: Dilution | |
| | |
| 2. Main purpose of LHR engine is to engine coolant heat losses, engine performance. | , hence |
| Option A: Reduce, Increases | |
| Option B: Reduce, Reduce | |
| Option C: Increase, Increase | |
| Option D: Increase, Reduce | |
| | |
| 3. Engine works on thermodynamic cycle with constant volume heat a | addition |
| process. | |
| Option A: Diesel | |
| Option B: Cl | |
| Option C: Gas turbine | |
| Option D: Petrol | |
| | |
| 4. Carburetor should provide air-tuel mixture in idling range. | |
| Option A: rich | |
| Option B: stoicniometric | |
| Option C: lean | |
| Option D: Chemically corrected | |
| 5 Eval is injected in intelse manifold in case of injection av | stom in |
| 5. Fuel is injected in intake mannold in case of injection sys | stem m |
| Option A: Timed | |
| Option B: Continuous | |
| Option C: direct | |
| Option D: Pulsating | |
| | |
| 6 Auxiliary valve is used in carburetor to richness of air-fuel r | nixture |
| Ontion A: Prevent | |

| Option B: | increases |
|-----------|-----------------------------------------------------------------------------------|
| Option C: | accelerate |
| Option D: | decelerate |
| - | |
| 7. | Ignition delay period in S.I. engine and ignition |
| | delay period in C.I. engine is desirable to avoid knocking. |
| Option A: | More, lesser |
| Option B: | Lesser, more |
| Option C: | More. more |
| Option D: | Lesser, lesser |
| | |
| 8. | Combustion chamber is not used in SI engine. |
| Option A: | T-head type |
| Option B: | L-head type |
| Option C: | Toroidal |
| Option D: | F-head type |
| | |
| 9. | Ignition quality of Diesel is expressed by |
| Option A: | Cetane number |
| Option B: | |
| Option C: | Self-ignition temperature |
| Option D: | |
| 10 | Ignition delay is duration between start of |
| 10. | of fuel |
| Option A: | ignition injection |
| Option B: | injection, ignition |
| Option C: | injection, flame propagation |
| Option D: | ignition. flame propagation |
| 1 | |
| 11. | Open combustion chambers are type of combustion chamber. |
| Option A: | Direct injection |
| Option B: | Direct ignition |
| Option C: | Indirect injection |
| Option D: | Indirect ignition |
| | |
| 12. | Volumetric efficiency is in induction swirl as compared to |
| | compression swirl in combustion chamber. |
| Option A: | Low |
| Option B: | high |
| Option C: | equal |
| Option D: | Better |
| 12 | |
| 13. | A tour cylinder tour stroke engine develops 250 kW at 3000 r.p.m. Its b.s.f.c. is |
| | 300 g/kwn. Fuel consumption per cylinder is kg/h. |
| Option A: | 18./3 |
| Option B: | y.5/3 27.5 |
| Option C: | 57.5 75 |
| Option D: | |
| 1 | |

| 14. | lubrication system is cheapest among all lubrication systems in |
|-----------|----------------------------------------------------------------------------|
| | I.C. Engine. |
| Option A: | Mist |
| Option B: | Dry sump |
| Option C: | Wet sump |
| Option D: | Cross |
| 1.7 | |
| 15. | Supercharging air compressor is driven by |
| Option A: | Exhaust gases |
| Option B: | Engine itself |
| Option C: | Separate electric motor |
| Option D: | Generator |
| 1.6 | |
| 16. | Cooling system is used in motor bikes. |
| Option A: | Air |
| Option B: | water |
| Option C: | Thermo syphon |
| Option D: | Pressurized |
| 17 | |
| 17. | If engine produces 8 kW brake power and absorbs 2 kW power to overcome the |
| | frictional losses by consuming 4 Kg/hr fuel. Then iste of an engine is |
| | Kg/kwn. |
| Option A: | 2/5 |
| Option B: | 1/3 |
| Option C: | 2.5 |
| Option D: | 1/4 |
| 18 | Heat balance sheet is an account of supplied and utilized |
| 10. | in various ways in the system/engine |
| Option A: | Heat work |
| Option R: | Work Heat |
| Option C: | Heat Heat |
| Option D: | Work work |
| Option D. | Work, work |
| 19 | ECU receives signal from |
| Option A: | Sensors |
| Option R: | Actuators |
| Option C: | Ignition coil |
| Option D: | Fuel injector |
| option D. | |
| 20 | Biodiesel blend B20 consist of % of biodiesel and B5 consist of |
| 20. | % of petroleum diesel |
| Option A: | 20.95 |
| Option B: | 20.5 |
| Option C: | 80.95 |
| Option D: | 80.5 |
| opuon D. | |

| Q2 | Solve any Four out of Six5 marks each |
|----|--------------------------------------------------------------------------------------|
| А | Illustrate construction and working of battery ignition system with the help of neat |
| | SKetch. |

| В | Describe construction and working of thermosyphon cooling system with the help |
|---|--------------------------------------------------------------------------------|
| | of Sketch. |
| С | State the advantages and disadvantages of Hydrogen and LPG as a fuel. |
| D | Differentiate 2-stroke engine and 4-stroke engine. |
| Е | Describe construction and working of CRDI injection system with the help of |
| | sketch. |
| F | Differentiate knocking in SI engine and CI engine. |

| Q3 | Solve any Two Questions out of Three 10 marks each |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| А | A four stroke engine using 0.272 kg/kWh fuel of 32 ⁰ API develops 15 kW per cylinder at 2000 r.p.m. The fuel injection pressure is 120 bar and the combustion chamber pressure is 30 bar. If the duration of injection is 25° of crack travel and velocity coefficient is 0.9. Determine the diameter of the fuel orifice. Take Specific gravity = $\frac{141.5}{1315 + API}$ |
| В | In a trial of single cylinder oil engine working on duel cycle, the following observation were made: Compression ratio = 15 Oil consumption = 10.2 kg/h Calorific value of fuel = 43890 kJ/kg Air consumption = 3.8 kg/min Speed = 1900 r.p.m. Torque on the brake drum = 186 N-m Quantity of cooling water used = 15.5 kg/min Temperature rise = 36^{0} C Exhaust gas temperature = 410^{0} C Room temperature = 20^{0} C Cp for exhaust gas = 1.17 kJ/kgK Determine the required parameters and draw heat balance sheet. |
| С | An 8 cylinder 4 stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 rpm on a dynamo-meter which has 54 cm arm. During a 10 minutes test the dynamo-meter scale beam reading was 42 kg and the engine consumed 4.4 kg of gasoline having a calorific value of 44000 kJ/kg. Air at 1 bar and 27° C was supplied to the carburetor at the rate of 6 kg/min. Determine (i) brake power, (ii) brake mean effective pressure, (iii) brake specific fuel consumption, (iv) brake specific air consumption, (v) brake thermal efficiency, (vi) volumetric efficiency and (vii) air fuel ratio. |

University of Mumbai Examination 2021 under cluster 08 (Lead College: PHCET)

Examinations Commencing from 16th June 2021 to 28th June 2021

Program: Automobile Engineering

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: AEC502 and Course Name: MMC

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | |
| 1. | If the instrument input is increased gradually from zero, there will be some minimum value below which no output change can be detected. The minimum value of input is called |
| Option A: | Hysteresis |
| Option B: | Threshold |
| Option C: | Drift |
| Option D: | Dead zone |
| • | |
| 2. | The "dead zone" in a certain pyrometer is 0.125 percent of span. The calibration is 400 ° C, to 1000 ° C. What temperature change might occur before it is detected |
| Option A: | 0.65° C |
| Option B: | 0.75° C |
| Option C: | 0.35° C |
| Option D: | 0.86° C |
| - | |
| 3. | A moving coil voltmeter has a uniform scale with 100 divisions, the full scale reading is 200 V and 1/10 of a scale division can be estimated with a fair degree of certainty. The the resolution of the instrument in volt is |
| Option A: | 0.2 V |
| Option B: | 2 V |
| Option C: | 2.2 V |
| Option D: | 0.4 V |
| 1 | |
| 4. | Rotameter is a |
| Option A: | drag force flow meter |
| Option B: | variable area flow meter |
| Option C: | variable head flow meter |
| Option D: | rotating propeller type flow meter |
| _ | |
| 5. | Thermopile is a |
| Option A: | combination of a number of thermocouples connected in series |
| Option B: | combination of a number of thermocouples connected in parallel |

| Option C: | combination of a number of thermocouples some of which are connected in series |
|-----------|--------------------------------------------------------------------------------------------|
| | and some in parallel |
| Option D: | single thermocouple |
| | |
| 6. | A flow meter that measures flow rates which are independent of density is |
| Option A: | Rotameter |
| Option B: | electromagnetic flow meter |
| Option C: | Venturimeter |
| Option D: | orifice meter |
| | |
| 7. | In a generalized measurement system, the function of a variable manipulation element is to |
| Option A: | convert the measurand into an analogous signal |
| Option B: | change the magnitude of the input signal retaining its nature |
| Option C: | perform linear operations |
| Option D: | perform non-linear operations |
| | |
| 8. | A stroboscope is used to measure |
| Option A: | Angular Velocity |
| Option B: | Pressure |
| Option C: | Strain |
| Option D: | Flow |
| | |
| 9. | Bonded wire strain gauges are |
| Option A: | Exclusively used for construction of transducers |
| Option B: | Used for both stress analysis and construction of transducer |
| Option C: | Pressure measurement |
| Option D: | Exclusively used for stress analysis |
| | |
| 10. | Nozzle flapper is used as controller |
| Option A: | Pneumatic |
| Option B: | Hydraulic |
| Option C: | Electric |
| Option D: | Robotic |
| | |
| 11. | Seismic transducer is used for measurement of |
| Option A: | angular velocity |
| Option B: | linear velocity |
| Option C: | acceleration |
| Option D: | pressure |
| | |
| 12. | Consider a negative feedback closed loop system whose open loop transfer |
| | function is $\frac{2(s+10)}{s^2+9s-10}$. The open loop poles are |
| | |
| Option A: | -1 and 10 |
| Option B: | 1 and -10 |
| Option C: | -1 and -10 |
| Option D: | 1 and 10 |

| 13. | Velocity error constant (K_v) of a system is measured when the input to the system |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | is unit function |
| Option A: | Parabolic |
| Option B: | Ramp |
| Option C: | Impulse |
| Option D: | step |
| | |
| 14. | The closed loop transfer function for a given system is given $\frac{C(S)}{R(S)} = \frac{5K}{R^2 + 505}$ |
| | $k = \frac{1}{k} + $ |
| | and the static velocity error constant is $\frac{1}{10.1}$. Natural frequency is |
| | |
| Option A: | √5k |
| Option B: | 5k |
| Option C: | $\sqrt{50.5}k$ |
| Option D: | k |
| _ | |
| 15. | The open loop transfer function for a given system is given $G(S) = \frac{20}{20}$. |
| | domning ratio is |
| | |
| Option A: | 0.51 |
| Option B: | 0.51 |
| Option C: | 0.75 |
| Option D: | 1 |
| Option D. | |
| 16 | Ear a positive feedback system the ferror function $C(S) = \frac{3}{3}$ and |
| | For a positive feedback system the forward transfer function $O(S) = \frac{1}{S(S+4)}$ and |
| | feedback transfer function $H(S) = 3S$, the characteristic equation is |
| | |
| Outing As | |
| Option A: | (5-5) = 0 |
| Option B: | (5+5) = 0 |
| Option C: | |
| Option D: | (5-4)=0 |
| 17 | The closed loss two sfor function for a unity feedback queter is given by T.F. |
| 17. | The closed loop transfer function for a unity feedback system is given by $1.F = 5S+10$ |
| | $\frac{1}{s^2 + 6s + 10}$, steady state error for unit ramp input is |
| | |
| Option A: | 0.1 |
| Option B: | 0.2 |
| Option C: | 0.3 |
| Option D: | 0.4 |
| | |
| 18. | is the time required for the response to reach 50 % of the final |
| | value in first attempt. |
| Option A: | Peak time |
| Option B: | Delay time |
| Option C: | Settling time |
| Option D: | Rise time |
| | |

| 19. | For a stable system |
|-----------|--------------------------------------------------------------------------------------|
| Option A: | gain margin must be positive but phase margin can be positive or negative |
| Option B: | phase margin must be positive but gain margin can be positive or negative |
| Option C: | both gain margin and phase margin must be positive |
| Option D: | one of them must be zero |
| | |
| 20. | If the Poles of the system lies on right hand side of the S plane then the system is |
| | said to be |
| Option A: | Unstable |
| Option B: | Stable |
| Option C: | Marginally stable |
| Option D: | Unpredictable |

| Q2 | Solve any Four out of Six5 marks each |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| А | A system is represented by the characteristic equation $P(S) = S^5+2S^4+2S^3+4S^2+S+1 = 0$, predict the stability of the system by using Routh's criterion. |
| В | Define desired input, modifying input and interfering input for measuring instruments. |
| С | A unity feedback system has $G(S) = \frac{20(S+3)}{S(S+1)(S+4)}$, determine (i) static error coefficients and (ii) steady state error for a ramp input of magnitude 5. |
| D | Illustrate with neat diagrams the working principle of electromagnetic flow meter with its applications |
| Е | Define the terms ' precision' and 'accuracy', 'span' and 'range' w.r.t static characteristics of measuring instruments. |
| F | While measuring the speed of a steam turbine with stroboscope single line images were observed for stroboscope setting of 30000, 4000 and 5230 r.p.m. Calculate the speed of the turbine. |

| Q3. | Solve any Two Questions out of Three 10 marks each |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | |
| А | The open loop transfer function of a unity feedback control system is given by $G(S) = \frac{K}{S(ST+1)}$, determine (i) by what factor 'k' be multiplied so that damping ratio is increase from 0.2 to 0.8. (ii) by what factor 'T' should be multiplied so that damping ratio is reduced from 0.9 to 0.3. |
| В | Illustrate with neat diagrams the construction and working principle of (i) McLeod Gauge and (ii) Bridgeman Gauge for pressure measurement with its industrial applications. |
| С | Draw the root locus and predict the stability of the system having $G(S)H(S) = \frac{K}{S(S+2)(S+4)}.$ |

University of Mumbai Examination 2020 under cluster 8 (Lead College: PHCET) Examinations Commencing from 15th June 2021 to 28th June 2021

Program: Automobile Curriculum Scheme: Rev - 2016 Examination: TE Semester V Course Code: AEC503 and Course Name: Heat Transfer

Time: 2 hour

Max. Marks: 80

| | |
|------|------|
| | |

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks | | |
|-----------|--------------------------------------------------------------------------------------------------------------|--|--|
| | | | |
| 1. | Due to which of the following reasons most metals are good conductors of heat? | | |
| Option A: | Presence of many free electrons and frequent collision of atoms | | |
| Option B: | Capacity to absorb free energy electrons | | |
| Option C: | Energy transport due to molecular vibration | | |
| Option D: | Migration of neutrons from hot end to cold end | | |
| | | | |
| 2. | The overall coefficient of heat transfer is used in the problems of | | |
| Option A: | Conduction | | |
| Option B: | Convection | | |
| Option C: | Conduction and convection | | |
| Option D: | Radiation | | |
| | | | |
| 3. | ε -NTU method is particularly useful in thermal design of heat exchangers | | |
| | when | | |
| Option A: | outlet temperature of the fluid stream is known as a priori | | |
| Option B: | the outlet temperature of the fluid streams is not known as a priori | | |
| Option C: | the outlet temperature of the hot fluid streams is known but that of the cold fluid | | |
| | streams is not known as a priori | | |
| Option D: | inlet temperatures of the fluid streams are known as a priori | | |
| | | | |
| 4. | How can the temperature drop in a plane wall with uniformly distributed heat | | |
| | generated be decreased ? | | |
| Option A: | By reducing thermal conductivity of wall material | | |
| Option B: | By reducing wall thickness | | |
| Option C: | By reducing convection coefficient at the surface | | |
| Option D: | By reducing heat generation rate | | |
| 5 | Unto the critical radius of insulation | | |
| Ontion A: | added insulation will increase heat loss | | |
| Option R: | added insulation will decrease heat loss | | |
| Option C: | convection heat loss will be less than conduction heat loss | | |
| Option D: | heat flux will decrease | | |
| option D. | | | |
| 6. | A furnace is made of a red brick wall of thickness 0.5 m and conductivity 0.7 | | |
| | W/mK. For the same heat loss and temperature drop, this can be replaced by a | | |
| | layer of diatomite earth of conductivity 0.14 W/mK and thickness | | |
| Option A: | 0.05 m | | |

| Option B: | 0.1 m |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option C: | 0.2 m |
| Option D: | 0.5 m |
| | |
| 7. | A steam pipe is covered with two layers of insulating materials, with the better insulating material forming the outer part. If the two layers are interchanged, the heat conducted |
| Option A: | will decrease |
| Option B: | will increase |
| Option C: | will remain unaffected |
| Option D: | may increase or decrease depending upon the thickness of each layer |
| _ | |
| 8. | Addition of fin to the surface increases the heat transfer if $(hA/kP)^{1/2}$ is |
| Option A: | equal to one |
| Option B: | greater than one |
| Option C: | less than one |
| Option D: | greater than one but less than two |
| option 21 | |
| 9. | Consider the following statements pertaining to large heat transfer rate using fins: 1. Fins should be used on the side where the heat transfer coefficient is small. 2. Long and thick fins should be used. 3. Short and thin fins should be used. 4. Thermal conductivity of fin material should be large. |
| | Which of the above statements are correct? |
| Option A: | 1 2 and 3 |
| Option B: | 1, 2 and 3 |
| Option C: | 2 3 and 4 |
| Option D: | 1 3 and 4 |
| option D. | |
| 10 | What does transient conduction mean? |
| Ontion A: | Heat transfer for a shot time |
| Option B: | Conduction when the temperature at a point varies with time |
| Option C: | Very little heat transfer |
| Option D: | Heat transfer with a very small temperature difference |
| Option D. | Treat transfer with a very small temperature unreferee |
| 11 | In which of the following access most unsteady heat flow occurs? |
| Option A: | Through the wells of a furnace |
| Option R: | Through lagged pipes corrying steem |
| Option D. | Through the well of a refrigerator |
| Option D: | During appealing of costing |
| Option D. | |
| 10 | France de composition in a l'ancid hadh is composition |
| | Forced convection in a inquite data is caused by |
| Option A: | density difference brought about by temperature gradients |
| Option B: | molecular energy interaction |
| Option C: | Flow of electros in a random fashion |
| Option D: | intense stirring by an external agency |
| | |
| 13. | In transient heat conduction, the two significant dimensionless parameters |
| | arenumber and number. |
| Option A: | Fourier, Reynolds |

| Option B: | Reynolds, Prandtl |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option C: | Biot, Fourier |
| Option D: | Reynolds, Biot |
| i | |
| 14. | Choose the wrong statements with respect to Nusselt number and convective heat transfer coefficients: |
| Option A: | Nusselt number represents the ratio of the temperature gradient at the surface to an overall of reference temperature gradient |
| Option B: | Nusselt number represents the dimensionless slope of the temperature distribution curve at the surface |
| Option C: | The convective coefficients can be evaluated from a knowledge of fluid temperature distribution in the neighborhood of the surface |
| Option D: | For a given Nusselt number, the convective coefficient is inversely proportional to thermal conductivity of the fluid |
| | |
| 15. | In case of laminar flow over a plate, the convective heat transfer coefficient |
| Option A: | decreases with increase in free stream velocity |
| Option B: | increases with distance |
| Option C: | increases if a higher viscosity fluid is used |
| Option D: | increases if a denser fluid is used |
| | |
| 16. | Consider the following statements pertaining to heat transfer through fins: 1. Fins are equally effective irrespective of whether they are on the hot side or cold side of the fluid. 2. The temperature along the fin is variable and hence the rate of heat transfer varias along the element of the fin |
| | The fin may be made of materials that have a higher thermal conductivity than the material of the wall. |
| | 4. Fins must be arranged at right angles to the direction of flow of the working fluid. |
| | Of these statements: |
| Option A: | 1 and 2 are correct |
| Option B: | 2 and 4 are correct |
| Option C: | 1 and 3 are correct |
| Option D: | 2 and 3 are correct |
| · | |
| 17. | An automobile radiator is type of heat exchanger |
| Option A: | cross-flow |
| Option B: | regenerator |
| Option C: | counter-flow |
| Option D: | Recuperator |
| 1.5 | |
| 18. | Due to which of the following reasons cork is a good insulator? |
| Option A: | It is a porous material |
| Option B: | Its density is low |
| Option C: | It can be powdered |
| Option D: | It is a non-porous material |
| | |
| 19. | Absorptivity of a body will be equal to its emissivity |
| Option A: | at critical temperature |
| Option B: | for a polished body |

| Option C: | at all temperatures | |
|-----------|-------------------------------------------------------------------------------------|--|
| Option D: | when the system is under thermal equilibrium | |
| | | |
| 20. | In a counter flow heat exchanger, the product of specific heat and mass flow rate | |
| | is same for the hot and cold fluids. If NTU is equal to 0.5, then the effectiveness | |
| | of the heat exchanger is | |
| Option A: | 1.0 | |
| Option B: | 0.5 | |
| Option C: | 0.33 | |
| Option D: | 0.2 | |

| Q2. | Solve any Four out of Six5 marks each | | |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| | | | |
| А | State Basic laws of Conduction, Convection and Radiation. Write mathematical equation of these laws. | | |
| В | Show that the temperature distribution in a slab or plane wall is a linear function of its thickness. | | |
| С | A longitudinal fin of rectangular profile is exposed to surroundings with a temperature of 65 °C and a heat transfer coefficient of 44 W/m ² k. The temperature of the fin base is 100 °C. The fin is made up of steel with thermal conductivity 30 W/mK and is 10 cm long, 1 cm thick and 1 m wide. Using insulated end determine the fin efficiency | | |
| D | Show by dimensional analysis for free convection, $Nu = \phi(Pr \times Gr)$. | | |
| E | Define shape factor. Explain its properties. | | |
| F | Derive an expression for LMTD in case of counter flow heat exchanger. | | |

| 03. | Solve any Two Questions out of Three | 10 marks each | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--|
| | | | |
| А | A counter-flow tubular oil cooler is to be designed to cool 1500 kg/h of oil from temperature 90 °C to 30 °C by means of water entering the cooler at 20 °C and leaving the cooler at 50 °C. Calculate the amount of water flow rate required and the heat transfer area. Take specific heat of oil as 3 kJ/kgK and overall heat transfer coefficient equal to 1200 W/m ² K. | | |
| В | A body having area 1000 cm ² has an effective temperature (i) the total rate of energy emission, (ii) the intensity of n (iii) intensity of radiation along a direction at 60 °C to the the wavelength of maximum monochromatic emissive pow | e of 900 K. Find normal radiation, e normal and (iv) er. | |
| С | Find the heat transfer from 60 W incandescent bulb at 100°C to ambient at 20°C. Assume the bulb as a sphere of 50 mm diameter. Also find t percentage of power lost by convection. C The correlation is given by: Nu = 0.6 $(Gr \times Pr)^{1/4}$ Take the following properties of the fluid: k = 0.002964 W/mK; v = 20.02 × 10 ⁻⁶ m ² /s & Pr = 0.694 | | |

University of Mumbai Examination 2021 under cluster 8 (Lead College: PHCET, Rasayani)

Examinations Commencing from 16th June 2021 to 28th June 2021

Program: Automobile Engineering Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: AEC504 Time: 2 hour Course Name: Automotive System Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are | | | |
|-----------------------|------------------------------------------------------------------------------|--|--|--|
| | | | | |
| 1 | What happens when clutch is disengaged? | | | |
| Option A [•] | Engine & flywheel get disconnected | | | |
| Option B: | Brakes pads & brake drum get disconnected | | | |
| Option C: | Differential & transmission get disconnected | | | |
| Option D: | Engine & transmission get disconnected | | | |
| F | | | | |
| 2. | In case of clutch, which statement is correct? | | | |
| Option A: | Inertia of the rotating components of the clutch should be maximum | | | |
| Option B: | Inertia of the rotating components of the clutch should be minimum | | | |
| Option C: | Lower component weight increases the inertia of clutch assembly | | | |
| Option D: | Higher component weight reduces the inertia of the clutch assembly | | | |
| | | | | |
| 3. | In case of disc type clutch, the clutch disc acts as a | | | |
| Option A: | driving member | | | |
| Option B: | driven member | | | |
| Option C: | neutral member | | | |
| Option D: | non rotating member | | | |
| | | | | |
| 4. | What among the following is not a function of gear box for front engine rear | | | |
| | wheel drive arrangement? | | | |
| Option A: | To vary the speed of output shaft | | | |
| Option B: | To vary the torque at output shaft | | | |
| Option C: | To vary the direction of rotation of output shaft | | | |
| Option D: | To vary the engine power output | | | |
| 5 | | | | |
| D. | When does the torque multiplication in torque converter becomes unity? | | | |
| Option A: | When turbing speed equals impeller speed | | | |
| Option B: | When turbing speed is lower than impeller speed | | | |
| Option C: | When turbine speed is lower than impelier speed | | | |
| Option D: | when imperier speed is greater than wheel speed | | | |
| 6 | In what type of gear box synchromesh device is used? | | | |
| Option A: | Synchromesh gear box | | | |
| Option B: | CVT box | | | |
| Option C: | Constant mesh gear box | | | |
| Option D: | Sliding mesh gear box | | | |
| option D. | | | | |

| 7. | What among the following is not the advantage of synchromesh gear box over | | |
|-----------|-----------------------------------------------------------------------------|--|--|
| | sliding mesh gear box? | | |
| Option A: | Jerk free engagement of gears | | |
| Option B: | Higher torque transmission | | |
| Option C: | Reduction in operating noise | | |
| Option D: | Availability of infinite number of gear ratios | | |
| | | | |
| 8. | If any one member in an epicyclic gear box is rotated and the remaining two | | |
| | members are allowed to run free, what is the condition? | | |
| Option A: | Direct Drive | | |
| Option B: | Forward drive | | |
| Option C: | Reverse drive | | |
| Option D: | Neutral | | |
| | | | |
| 9. | Which among the following is not a manual transmission? | | |
| Option A: | Sliding mesh gear box | | |
| Option B: | | | |
| Option C: | Constant mesh gear box | | |
| Option D: | Synchromesn gear box | | |
| 10 | Why differential is used in outemphile? | | |
| 10. | To increase the speed of road wheel | | |
| Option B: | To avoid skidding at straight road | | |
| Option C: | To avoid skidding while turning | | |
| Option D: | To avoid skidding while turning | | |
| Option D. | | | |
| 11. | When power has to be transmitted at an angle, what is used? | | |
| Option A: | Slip joint | | |
| Option B: | Centrifugal Clutch | | |
| Option C: | Gear Box | | |
| Option D: | Universal Joint | | |
| | | | |
| 12. | Why propeller shaft is made hollow? | | |
| Option A: | To reduce whirling effect | | |
| Option B: | To reduce the aesthetic look | | |
| Option C: | To increase whirling effect | | |
| Option D: | To increase the aesthetic look | | |
| 13. | What is the function of brake value? | | |
| Option A: | To control the flow of compressed air from air reservoir to air chamber | | |
| Option B: | To control the flow of compressed air from master cylinder to air chamber | | |
| Option C: | To control the flow of compressed air from air reservoir to master cylinder | | |
| Option D: | To control the flow of compressed air from master cylinder to air reservior | | |
| • | | | |
| 14. | What is spring rate? | | |
| Option A: | Load required to break the spring | | |
| Option B: | Load required to deflect the axle by spring | | |
| Option C: | Load required to deflect the spring per unit distance | | |
| Option D: | Load required to provide rigidity to the spring | | |
| | | | |

| 15. | What will happen if brakes of only one side get applied for a running car? | | |
|-----------|-----------------------------------------------------------------------------------|--|--|
| Option A: | Car will continue its motion | | |
| Option B: | Car will be pulled to that side on which brakes does not get applied | | |
| Option C: | Car will be pulled to that side on which brakes get applied | | |
| Option D: | Pitching movement will occur for a car | | |
| | | | |
| 16. | What is brake bleeding? | | |
| Option A: | Process of removing air from the hydraulic brake system | | |
| Option B: | Process of adding air into the hydraulic brake system | | |
| Option C: | Process of removing oil from air brake system | | |
| Option D: | Process of adding oil into air brake system | | |
| | | | |
| 17. | What suspension system does? | | |
| Option A: | It helps to increase the speed of vehicle | | |
| Option B: | It provides more torque in uptrend | | |
| Option C: | It absorbs heat energy in down trend | | |
| Option D: | It provides cushioning action | | |
| | | | |
| 18. | What is a condition called when the vehicle move away from its desired path | | |
| | during cornering and to keep it on the right path there is need to steer a little | | |
| | more? | | |
| Option A: | Understeer | | |
| Option B: | Oversteer | | |
| Option C: | Reversibility | | |
| Option D: | Irreversibility | | |
| | | | |
| 19. | When the top of the wheel is tilted outward, then it is called as | | |
| Option A: | King pin inclination | | |
| Option B: | Positive camber | | |
| Option C: | Negative camber | | |
| Option D: | Caster angle | | |
| | | | |
| 20. | Where does wear occur for under inflated tyre? | | |
| Option A: | Near center | | |
| Option B: | Near the edge | | |
| Option C: | In the cross direction | | |
| Option D: | In the lateral direction | | |

| Q2 | Solve any Four out of Six | (05 marks each) |
|----|------------------------------------------------------------|-----------------|
| А | Explain the clutch plate construction. | |
| В | Explain the construction of sliding mesh gearbox. | |
| С | Explain the role of constant velocity joint in automobile. | |
| D | Explain the any one type of rear axle arrangement in deta | ail. |
| E | Explain the working of master cylinder with neat labeled | l diagram. |
| F | Explain the rack & pinion steering gear. | |

| Q3 | Solve any Four out of Six | (05 marks each) |
|----|----------------------------------------|-----------------|
| А | Write short note on centrifugal clutch | |

| В | Write short note on overdrive |
|---|----------------------------------------------------|
| С | Write short note drive line arrangements. |
| D | Write short note on transfer case. |
| E | Write note on types of adaptive suspension system. |
| F | Write short note on types of road wheels. |

University of Mumbai Examination 2021 under cluster 8 (Lead College: PHCET)

Examinations Commencing from 16th June 2021 to 28th June 2021

Program: BE **Automobile** Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: AEDLO5011 and Course Name: Press Tool Design

Time: 2 hour ____

Max. Marks: 80

| 01 | Choose the correct option for following questions. All the Questions are | |
|----|--------------------------------------------------------------------------|--|

| (40 | compulsory and carry equal marks |
|---------------|---------------------------------------------------------------------------------|
| (40 Marks) | |
| 11111115) | |
| 1. | In Cutting operations, the workpiece is stressed beyond its |
| Option A: | Tensile Pressure |
| Option B: | Viscosity |
| Option C: | Ultimate Strength |
| Option D: | Young's Modulus |
| | |
| 2. | The workpiece obtained after one or more press operations is called a |
| Option A: | Metal Wrapping |
| Option B: | Metal Stamping |
| Option C: | Metal Shaving |
| Option D: | Metal Lancing |
| | |
| 3. | guiding components ensures the accurate alignment of the upper shoe |
| | with the die shoe in operations |
| Option A: | Guide Posts and Punch Holder |
| Option B: | Punch Holder and Die holder |
| Option C: | Bushings and Die-Blocks |
| Option D: | Guide posts and Bushings |
| | |
| 4. | In blanking operation, clearance is applied on to form the desired |
| | blank. |
| Option A: | Punch |
| Option B: | Die-Opening |
| Option C: | Guide Post |
| Option D: | Die-Block |
| | |
| 5. | The tonnage of mechanical press is determined by |
| Option A: | Piston area * oil pressure in the cylinder |
| Option B: | Die-Opening * Punch holder |
| Option C: | Ultimate pressure * Ultimate stress |
| Option D: | Shear strength of the crankshaft material * the area of the crankshaft bearings |
| | |
| 6. | The maximum force F(max) required to cut a material is given by, |
| Option A: | F(max) = Punch travel |
| Option B: | F(max) = Sheared area * Shearing strength |

| Option C: | F(max) = Punch travel * Clearance |
|-----------|-----------------------------------------------------------------------------|
| Option D: | F(max) = Shearing strength * Shearing stress |
| | |
| 7. | Find the force required to shear a 50 mm diameter hole in a 4 mm thick M.S. |
| | sheet.(Ultimate Shear strength = 400 N/mm^2) |
| Option A: | 251.327 kN |
| Option B: | 151.423 kN |
| Option C: | 352,534 kN |
| Option D: | 101 555 kN |
| option D. | |
| 8 | To find out the back scrap in a strip layout which formula is used? |
| Option A: | a = h + 0.015t |
| Option B: | $a = t_{-} 0.015h$ |
| Option C: | a = t + 0.015h |
| Option D: | a = 0.015h = t |
| Option D. | |
| 0 | is used for the nurpose of correcting the feed error immediately before |
| 2. | is used for the purpose of confeeting the feed effor minimulately before |
| Option A: | Stripper |
| Option R. | Stock ston |
| Option C: | Knockout |
| Option D: | Dilot |
| Option D. | |
| 10 | Guiding components such as guide post and husbes are made up of |
| Ontion A: | |
| Option R. | |
| Option D. | |
| Option C: | Cast IIOII Mild Steel |
| Option D: | |
| 11 | The farming healt' affect in mass working is |
| 11. | The spring back effect in press working is |
| Option A: | partial recovery of the sheet metal |
| Option B: | Fleate of stored energy in the sheet metal |
| Option C: | Elastic recovery of the sneet metal after removal of the load. |
| Option D: | regaining the original shape of the sheet metal |
| 12 | |
| 12. | Which formula is used to calculate blank size in the drawing process, |
| | where thin gauge stock is used and the shell has a sharp inside corner? |
| | |
| | (Condition : $d/r \ge 20$, r is radius of bottom corner) |
| | |
| | D = Flat Blank Diameter |
| | d = Finished Shell diameter |
| | h = Height of the finished shell |
| | |
| Option A: | $D = \sqrt{(d^2 + 4dh)}$ |
| Option B: | $D = \sqrt{(d^2 + 4h)}$ |
| Option C: | d = √(D*2 + 4Dh) |
| Option D: | h = √(D*2 + 4d*D) |

| 13. | Select the correct formula for calculating Bend allowance. |
|---------------|-----------------------------------------------------------------------------------|
| | B = Bend allowance along neutral axis, cm |
| | α = Bend angle in degree |
| | r = Inside radius of bend, cm |
| | k = Distance of neutral axis from inside surface of the bend |
| | |
| Option A: | $B = (\alpha/360) * (\pi (2r + k))$ |
| Option B: | $B = (\alpha/360) * (2\pi (r + k))$ |
| Option C: | $B = (\alpha/360) * (\pi (r + k))$ |
| Option D: | $B = (\alpha/360) * (2\pi (r + 2k))$ |
| | |
| 14. | During the bending operation, the outer surface of the material is in |
| | and the inside surface is in |
| Option A: | compression and tension |
| Option B: | tension and compression |
| Option C: | frictional and squeezing |
| Option D: | squeezing and frictional |
| | |
| 15. | The process of making cup-shaped parts from a flat sheet metal blank is known as |
| Option A: | Angle Drawing |
| Option B: | Length Drawing |
| Option C: | Wire Drawing |
| Option D: | Deep Drawing |
| | |
| 16. | In a compound die |
| Option A: | Two or more operations are performed simultaneously at the single stroke of the |
| | punch |
| Option B: | Two or more cutting operations are performed at one station of the press in every |
| | stroke of the punch |
| Option C: | Both cutting and non-cutting operations are performed at one station of the press |
| | in every stroke of the punch |
| Option D: | Only one operation is performed at each stroke of the punch |
| | |
| 17. | In which type of die both cutting and non-cutting operations are performed at one |
| | station of the press in every stroke of the punch |
| Option A: | Compound die |
| Option B: | Embossing die |
| Option C: | |
| Option D: | Coining die |
| 10 | |
| 18. Orti 1 | die produces a raised readable mark on the flat workpiece. |
| Option A: | Embossing |
| Option B: | |
| Option C: | Combination |
| Option D: | Progressive |
| 10 | Undersalie masse is most suitable for |
| 19. | Hydraulic press is most suitable for |
| Option A: | Deep-urawing Displain a |
| Option B: | Blanking |
| Option C: | Piercing |

| Option D: | Trimming |
|-----------|--------------------------------------------------------------|
| | |
| 20. | The greatest source of accidents in automation press shop is |
| Option A: | Hand driven machine |
| Option B: | Tool with flat edge |
| Option C: | Power driven machine |
| Option D: | Tool with sharp edge |

| Q2. (20 Marks) | Attempt any Four out of Six Questions | (5 marks each) |
|-------------------|------------------------------------------------------------------------------------|------------------|
| А | Classify press working operations and explain notching neat diagram | operation with a |
| В | Differentiate between blanking operation and piercing ope | ration |
| С | What is spring back in bending operation and explain a compensate the spring back. | nyone method to |
| D | Explain working and construction of embossing die. | |
| E | Differentiate between compound die and combination die | |
| F | Write safety precautions taken in the press shop. | |

| Q3. (20 Marks) | Solve any Two out of Three Questions(10 marks each) |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| А | Find the total pressure, dimensions of tools to produce a washer of 5.5 cm outer diameter with 2.5 cm diameter hole, from a material of 4 mm thickness, having shear strength of 350 N/mm ² . (Assume Clearance 10% of stock thickness) |
| В | A symmetrical-cup workpiece with a height of 50 mm and a diameter of 50 mm, the inner corner radius is 1.6 mm. The workpiece material is cold-rolled steel of 0.8 mm thick. Make necessary calculations for designing the drawing die for this part. |
| С | Find the centre of pressure for the following blanks. Find the centre of pressure for the following blanks. $ \begin{array}{c} & 20 \\ & 20 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ & 60 \\ $ |