Aeronautical Engineering Department

Bright Star University, El -Brega

Faculty of Aeronautics Science

Description of Course Content

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الجانب الأكاديمي

بيانات رئيس القسم

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1.1كلمة رئيس القسم:

بسم الله الرحمن الرحيم
الحمد لله و الصلاة و السلام على رسول الله وعلى آله و صحبه ومن والاه
وبعـــــد،

يسعى قسم هندسة ميكانيكا طيران في إن يشارك في إنجاح رؤية جامعة النجم الساطع، في أن يكون مساهماً رئيسياً في التعليم العالي ومتميزا بالتعليم المرتكز على التميز والابتكار والانخراط في المجتمع والمساهمة في الإنعاش الاقتصادي والتحول الاجتماعي والارتقاء بمستوى المعيشة.

ويسعى قسم هندسة ميكانيكا الطيران لتقديم تعليم جامعي متميز في هندسة ميكانيكا الطيران بين مثيلاته في الدول العربية والعالمية يرقى إلى مصاف المعايير العالمية وإعداد خريجين مؤهلين ومدربين يمتلكون قدرات ذهنية ومهارات بحثية ومهنيةوالمساهمة الفعالة في تطوير الثقافة التقنية في هندسة ميكانيكاالطيران ونشرها، وتوجيهها لخدمة حاجات المجتمعو ألارتقاء بالبحوث العلمية لتكون على المستوى ألعالمي، و إن يكون احد الروافد في تهيئة كوادر هندسية متخصصة ذات كفاءة عالية في مجال تقنيات هندسة ميكانيكا الطيران والذين بإمكانهم تغطية قطاعات واسعة في المجالات المختلفة وضمن القطاعين العام والخاص بالإضافة إلى تقديم تعليم مميز وإنتاج بحوث إبداعية تخدم المجتمع، وتسهم في بناء المعرفة من خلال إيجاد بيئة محفزة للتعلم والإبداع الفكري والتوظيف الأمثل للتقنية والشراكة المحلية والعالمية الفاعلة

يهتم قسم الهندسة ميكانيكا طيران بدراسة الأنظمة الميكانيكية في مجال الطيران من حيث التصميم والتصنيع والصيانة والإدارة. حيث تعتبر هندسة ميكانيكا الطيران أساس لكافة الفروعالهندسيةالأخرى في مجال الطيران لما لهذا التخصص من ارتباط بجميع الأقسام الهندسية في مجال الطيران وبناءاً على ذلك فإن خريجي قسم هندسة

ميكانيكاالطيرانقادرون على العمل في مختلف قطاعات المجتمع مثل قطاع الطيران ،وقطاع توليد الكهرباء و تحليه المياه ، وقطاع الصناعات الثقيلة .

حيث تم إنشاء قسم هندسة ميكانيكا الطيران كقسم يتبعكلية الهندسة التقنية بجامعة النجم ك أو لقسم في المنطقة الشرقية ومن ثم تم ضم القسم لكلية علوم الطيران بعد اعتمادها كأحدأقسامها الهندسية بالكلية، وقد تم تصميم برنامج هندسة ميكانيكا الطيران حسب المعايير الدولية وقواعد التعليم الهندسي التقني لإعداد الخريجين المؤهلين للعمل في مختلف قطاعات الدولة العامة والخاصة.

حيث يتمتع ويمتلك خريجي قسم هندسة ميكانيكا الطيران على:-

- القدرة على الإدارة والعمل على معدات الإسناد الأرضية والجوية.القدرة على التصميم الميكانيكي باستخدام أحدث برامج التصميم والمحاكاة ثلاثية الإبعاد
- القدرة على العمل بأحدث أجهزة تشخيص الأعطال الميكانيكية والكهربائية والالكترونية لمنظومات الطائرة.
- القدرة على التكيف مع الاختصاصات المتشابهة (هندسة الاتصالات، هندسة التكيف والتبريد، الهندسة الميكانيكية، الطاقات المتجددة، وغيرها).
- العمل في صيانة الآلات الحرارية، والتوربينات البخارية في محطات توليد الطاقة الكهربائية سواء كان مصدر الحرارة وقود نووي أوغيره.
- مجال تصميم وتصنيع المحركات (هندسة المحركات).
- العمل في محطات توليد القوى حيث أهم جزء هو (التوربينه) بالإضافة إلى مصدر توليد الحرارة (الغلايات)

ولقد عُرف عن القسم قوة برنامجه العلمي في تدريس المقررات واستقطاب أعضاء هيئة التدريس المتميزين للحفاظ على المستوى العالي لخريجي القسم.ولقد قام القسم بتخريج مهندسين في مجال هندسة ميكانيكا طيران .

أما بالنسبة للنظرة المستقبلية للقسم فتتمثل فى العمل على إعداد بحوث علمية ذات مُعامل علمي عالي ومشاريع تخرج فعالة يحتاجها المجتمع في مجال الطيران مع تحديث و تطوير المقررات الدراسية و والسعي لفتحبرنامج متكامل للدراسات العليا (الماجستير)بالتعاون مع المؤسسات التعليمية المحلية والعالمية القسم لمواكبة التطور الحاصل في كافة المجالات العلمية والتقنية.

وفق الله الجميع لما فيه خير البلاد والعباد

والسلام عليكم ورحمة الله وبركات

1.2نبذة القسم:

يعتبر قسم هندسة ميكانيكا الطيران القسم الاقدم بالكلية حيث يحتوي على 48 طالباً وطالبة وتم تخريج 4 دفعات حتى الأن منذ افتتاحه بالجامعة وتتلخص رؤية القسم بأن يكون متميزاً في التعليم و البحث في مجال هندسة ميكانيكا الطيران و إعداد مهندسين على درجة عالية من الكفاءة والقيادة في مجالات المعرفة والتصميم والتطبيق وتشغيل أنظمة هندسة الطيران.

1.3رؤية القسم :

أن يكون القسم متميزاً في التعليم و البحث في هندسة ميكانيكا الطيران.

1.4 رسالة القسم :

إعداد مهندسين على درجة عالية من الكفاءة والقيادة في مجالات المعرفة والتصميم والتطبيق وتشغيل أنظمة هندسة الطيران.

1.5أهداف القسم :

1- إن الأهداف التعليمية لبرنامج هندسة الطيران في جامعة النجم الساطع هي إعداد خريجين قادرين على الانخراط في الحياة المهنية في المجالات المختلفة: الصناعية، والعسكرية ، و الأكاديمية ،و البحثية مخرجات القسم التعليم

أ- تطبيق المعرفة في الرياضيات والعلوم الأساسية ومبادئ الهندسة في حل المشاكل الصناعية.
ب- تصميم وتطوير وتطبيق التجارب الهندسية وتحليل البيانات المخرجة.
ج- تصميم الأنظمة وأجزائها أو تصميم العمليات التي تفي بالغاية المطلوبة.
د- تشكيل فرق عمل للمشاريع الصفية ومشاريع التخرج والمشاركة الفعالة في الفريق وتطبيق مهارات إدارة الوقت.
ه- نمذجة المشاكل الهندسية باستخدام نماذج رياضية محوسبة والخروج بحلول وتصميم للمتحكمات لديمومة الفاعلية. تشخيص المشاكل الصناعية وطرح الحلول لاستمرار التطوير.
و- تطبيق معايير بأخلاقيات و مهنية مهندس الطيران.
ز- كتابة التقارير التقنية وإلقاء الأطروحات المحترفة باستخدام أحدث التقنيات. ممارسة التواصل مع الصناعة ومهارات التفاعل الإيجابي في الفريق.
ح- إدراك أثر الحلول الهندسية في الصناعة والمجتمع والبيئة.
ط- إظهار القدرة على البحث عن المعلومة والمواكبة وتحصيل تعليم إضافي مستمر.
ي- مواكبة أحدث التقنيات والتقدم في المجالات المرتبطة بهندسة الطيران والهندسة بشكل عام بمساعدة أحدث مصادر المعرفة.
ك- تطبيق التقنيات المدروسة والأدوات الحديثة والمهارات لحل المشاغل الهندسية

1.6متطلبات درجة البكالوريوس في هندسة الطيران (162وحدة معتمدة):

تمنح درجة البكالوريوس في هندسة ميكانيكا الطيران بكلية علوم الطيران في جامعة النجم الساطع وفقا للشروط المنصوص عليها في تعليمات منح درجة البكالوريوس في جامعة النجم الساطع الصادرة عن مجلس العمداء بموجب نظام منح الدرجات العلمية والشهادات في جامعة النجم الساطع لسنة 2017 م وبعد إنهاء (162)وحدة معتمدة .

1.7منسقـــي القســـم:

- منســـق الدراسة والامتحانات بالقســم
- منســـق أعضاء هيئة التدريس بالقسم
- منســـق الجودة وتقييم الأداء بالقســم
- منســـق المعـــــامل بالقســـــــــم

1.8- رؤساء القســـم تصاعديا:

1. ---------- - الدرجة العلمية: مساعد محاضر- فترة رئاسة القسم (XXX)

1.9- أبحـــــــاث القســـم:

جاري العمل بالتنسيق مع أعضاء هيئة التدريس بالقسم

1.10 - الاتصـــال بالقســـم:

lمبنى كلية العلوم - مكتب السيد رئيس قسم هندسة ميكانيكا الطيران

رئيس القســم: أ.عبدالهادي عبدالرازق بوزغيبة

بريد الكتروني:Email: (abdelhad.buzghaiba@gmail.com)

الخطة الدراسية للقسم العام

مقررات الفصل الاول - 21 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الاسبوعية			المتطلب الدراسي السابق
				نظري	تطبيقي	عملي	
1	كيمياء (1)	GS 111	4	3	-	2	-
2	فيزياء (1)	GS 112	4	3	-	2	-
3	رياضة (1)	GS 113	3	2	1	-	-
4	مبادئ الحاسب الالي (1)	GE 114	2	2	-	-	-
5	لغة إنجليزي (1)	GH 115	3	2	1	-	-

6	ثقافة عامة	GH 116	2	2	-	-	-
7	رسم هندسي (1)	GE 117	3	2	-	2	-
	المجموع		21	16	2	6	

مقررات الفصل الثاني- 22 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق
				نظري	تطبيقي	عملي	
1	كيمياء (2)	GS 121	4	3	-	2	GS 111
2	فيزياء (2)	GS 122	4	3	-	2	GS 112
3	رياضة (2)	GS 123	3	3	1	-	GS 113
4	تطبيقات حاسوب (2)	GE 124	3	2	-	2	GE 114
5	لغة انجليزي (2)	GH 125	3	2	1	-	GH 115
6	لغة عربية	GH 126	2	2	-	-	-
7	رسم هندسي (2)	GE 127	3	2	-	2	GE 117
	المجموع		22	16	2	8	

المجموع الكلي	المقررات الدراسية	الوحدات المعتمدة	الساعات الاسبوعية		
			نظري	تطبيقي	عملي
	14	43	32	4	14

(ب)مواد تخصص اختيارية:

وتشمل(6) وحدة معتمدة.

البرنامج الدراسي للقسم

مقررات الفصل الثالث - 21 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق
				نظري	تطبيقي	عملي	
1	English Language II	GH 231	3	2	1	-	GH 125
2	Mathematics III	GS 232	3	2	1	-	GS 123
3	Workshops Technology	GE 233	3	2	-	2	-
4	Engineering Thermodynamics	GE 234	3	2	1	-	GS112
5	Circuit	GE 235	3	2	-	2	GS123, GS122

GS113, GS112	-	1	2	3	GE 236	ENGINEERING MECHANICS	6
GS124,GE127	2	-	2	3	AE 237	Computer Graphics and Solid Modeling	7
	6	4	14	21		المجموع	

مقررات الفصل الثالث - 21 وحدة

ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق
				نظري	تطبيقي	عملي	
1	لغة انجليزية (3)	GH 231	3	2	1	-	GH 125
2	رياضة (3)	GS 232	3	2	1	-	GS 123
3	تقنية ورش هندسية	GE 233	3	2	-	2	-
4	الديناميكا الحرارية	GE234	3	2	1	-	GS112
5	أسس الهندسة الكهربية	GE235	3	2	-	2	GS123, GS122
6	ميكانيكا هندسية(1)	GE236	3	2	1	-	GS113, GS112
7	الرسم بالحاسوب	AE 237	3	2	-	2	GS124,GE127
	المجموع		21	14	4	6	

مقررات الفصل الرابع - 20 وحدة

ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق أو المرافق
				نظري	تطبيقي	عملي	
1	Technical Report writing	GH241	3	2	1	-	GH 231
2	ELEMENTS OF AERONAUTICS	AE242	3	2	1	-	-
3	Measurements and Instrumentation	AE243	3	2	-	2	GE235,GS112
4	Engineering Materials	GE244	3	2	1	-	-
5	Fluid Mechanics	GE245	3	2	-	2	GE234,GE236
6	NUMERICAL METHODS	GE246	3	2	1	-	GS232,GS124
7	AIRCRAFT MATERIALS	AE247	2	2	1	-	GE 233 ,GE 244
	المجموع		20	14	5	4	

مقررات الفصل الرابع - 20 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الاسبوعية			المتطلبالدراسيالسابق اوالمرافق
				نظري	تطبيقي	عملي	
1	مناهج البحث وكتابة التقارير الفنية	GH241	3	2	1	-	GE231
2	مقدمة في هندسة طيران	AE242	3	2	1	-	-
3	قياسات وأجهزة دقيقة	AE243	3	2	-	2	GE235,GS112
4	هندسة المواد	GE244	3	2	1	-	-
5	ميكانيكا الموائع	GE245	3	2	-	2	GE234,GE236
6	تحليل عددي	GS246	3	2	1	-	GS232,GS124
7	مواد بناء الطائرات	AE247	2	2	1	-	GE 233 ,GE 244
	المجموع		20	14	5	4	

مقررات الفصل الخامس - 22 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق أو المرافق
				نظري	تطبيقي	عملي	
1	PROPULSION - I	AE351	3	2	1	-	ME245
2	Strength of materials	ME352	3	2	-	2	ME 236,GE 244
3	HEAT TRANSFER	AE353	3	2	-	2	GE 234
4	AIRCRAFT SYSTEMS AND INSTRUMENTS	AE354	3	2	1	-	AE 242ME 245
5	Composite Materials and Structures	AE355	3	2	1	-	ME 244,AE 247
6	AERODYNAMICS – I	AE356	3	2	-	2	GE 245
7	MECHANICS OF MACHINES	AE357	4	2	1	2	GE 236,
	المجموع		22	14	4	8	

مقررات الفصل الخامس - 22 وحدة						
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلبالدراسيالسابق اوالمرافق
				نظري	تطبيقي	عملي	
1	الدفع -I	AE 351	3	2	1	-	ME245
2	مقاومة المواد	ME 352	3	2	-	2	ME 236,GE 244
3	انتقال الحرارة	AE 353	3	2	-	2	GE 234
4	منظومات الطائرة	AE 354	3	2	1	-	AE 242ME 245
5	مواد مركبة	AE 355	3	2	1	-	ME244,AE247
6	الديناميكا الهوائية-I	AE 356	3	2	-	2	AE 247
7	ميكانيكا ونظرية الآلات	AE 357	4	2	1	2	ME 236, GE 237
	المجموع		22	14	4	8	

مقررات الفصل السادس - 20 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلبالدراسي السابق أو المرافق
				نظري	تطبيقي	عملي	
1	Engineering Economy and Financial Management	GE361	2	2	-	-	-
2	AERODYNAMICS - II	AE362	3	2	-	2	AE 356
3	AIRCRAFT STRUCTURES - I	AE363	3	2	-	2	AE 356
4	Mechatronics and Modern Control	ME 364	3	2	1	-	AE 354
5	VIBRATIONS AND AROELASTICITY	AE365	3	2	1	-	ME 236
6	PROPULSION - II	AE366	3	2	-	2	AE 351
7	Statistics & Probability	AE367	2	2	-	-	-
	المجموع		19	14	2	6	

مقررات الفصل السادس - 20 وحدة						
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الاسبوعية			المتطلب الدراسيالسابق او المرافق
				نظري	تطبيقي	عملي	
1	أساسيات الاقتصاد الهندسي	GE361	2	2	-	-	GS 242
2	الديناميكا الهوائية-II	AE362	3	2	-	2	AE 356
3	هياكل (تركيب) الطائرات- I	AE363	3	2	-	2	AE 356
4	مايكترونيك	ME364	3	2	1	-	AE 354
5	الاهتزازات الميكانيكية	AE365	3	2	1	-	ME 236
6	الدفع -I	AE366	3	2	-	2	AE 351 , AE 356
7	الإحصاء والاحتمالات	AE367	2	2	-	-	
	المجموع		19	14	2	6	

مقررات الفصل السابع - 18 وحدة						
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق أو المرافق
				نظري	تطبيقي	عملي	
1	AIRCRAFT STRUCTURES - II	AE471	3	2	-	2	AE 363
2	HIGH TEMPERATURE MATERIALS	AE472	3	2	-	2	AE 367
3	FLIGHT DYNAMICS	AE473	3	2	1	-	AE 356 ,AE364
4	ELECTIVE -II	AE474	3	2	1	-	AE 367
5	AIRCRAFT ENGINE DESIGN	AE475	3	2	-	2	AE 366 , AE 472
6	CONTROL ENGINEERING	AE476	2	2	-	-	AE 364
7	Project -I	AE477	2	2	2	2	AE 366 AE 363
	المجموع		19	41	4	8	

مقررات الفصل السابع - 18 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلبالدراسيالسابق اوالمرافق
				نظري	تطبيقي	عملي	
1	هياكل(تركيب) الطائرات -II	AE471	3	2	-	2	AE 363
2	مواد عالية الحرارة	AE472	3	2	-	2	AE 367
3	ديناميكا الطيران	AE473	3	2	1	-	AE 356 ,AE364
4	متطلب اختياري-II	AE474	3	2	1	-	AE 367
5	تصميم محرك الطائرة	AE475	3	2	-	2	AE 367
6	أنظمة التحكم في الطيران	AE476	2	2	-	-	AE 364
7	مشروع التخرج -I	AE477	2	2	2	2	AE 363, AE366
	المجموع		19	14	4	8	

مقررات الفصل الثامن- 21 وحدة							
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق
				نظري	تطبيقي	عملي	
1	AVIONICS	AE481	3	2	-	2	-
2	AIRCRAFT DESIGN	AE482	3	2	-	2	AE 471
3	COMPUTATIONAL FLUID DYNAMICS	AE483	3	2	-	2	-
4	AIRCRAFT ENGINEERING MAINTENANCE	AE484	3	2	-	2	AE 471
5	Elective -III	AE485	2	2	1	-	AE 475
6	Project -II	AE486	4	2	1	4	
	المجموع		18	12	5	12	

مقررات الفصل الثامن- 21 وحدة						
ر م	اسم المقرر	رمز المقرر	عدد الوحدات المعتمدة	عدد الساعات الأسبوعية			المتطلب الدراسي السابق أو المرافق
				نظري	تطبيقي	عملي	
1	الكترونيات الطيران	AE 481	3	2	-	2	-
2	تصميم الطائرات	AE 482	3	2	1	2	AE 473
3	ديناميكا الموائع الحسابية	AE 483	3	2	-	2	-
4	أنظمة صيانة الطائرات	AE 484	3	2	1	2	AE 471
5	متطلب اختياري-III	AE 485	2	2	-	-	
6	مشروع تخرج -II	AE486	4	2	1	4	
	المجموع		18	12	5	12	

المجموع الكلي	المقررات الدراسية	الوحدات المعتمدة	الساعات الأسبوعية		
			نظري	تطبيقي	عملي
	41	119	80	22	42

3. THIRD SEMESTER

Course no.	**GH 231**	
Course Title.	**English Language III**	
Credit.	**3Credit**	**Hours per week.(?Lec+?Tut+?lab)**
Prerequisite.	**GH 125**	
Course Description.		

Course no.	**GS 232**
Course Title.	**Mathematics III**

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Credit.	3Credit	Hours per week.(?Lec+?Tut+?lab)
Prerequisite.	GS 123	
Course Description.		

Course no.	GE 233	
Course Title.	Workshops Technology	
Credit.	3Credit	Hours per week.(?Lec+?Tut+?lab)
Prerequisite.	None	
Course Description.		

Course no.	ME 234	
Course Title.	Engineering Thermodynamics	
Credit.	3Credit	Hours per week.(?Lec+?Tut+?lab)
Prerequisite.	GS112	
Course Description.		

Course no.	GE 235	
Course Title.	Circuit	
Credit.	3Credit	Hours per week.(?Lec+?Tut+?lab)
Prerequisite.	GS123, GS122	
Course Description.		

Course no.	GE 236	
Course Title.	Applied Mechanics	
Credit.	3Credit	Hours per week.(?Lec+?Tut+?lab)
Prerequisite.	GS113, GS112	
Course		

Description.	

Course no.	**ME 237**	
Course Title.	**Computer Graphics and Solid Modeling**	
Credit.	**3Credit**	**Hours per week.(?Lec+?Tut+?lab)**
Prerequisite.	**GS124,GE127**	
Course Description.		

4. FOURTH SEMESTER

Course no.	**ME 241**	
Course Title.	**Technical Report writing**	
Credit.	**3Credit**	**Hours per week.(?Lec+?Tut+?lab)**
Prerequisite.	**GH 231**	
Course Description.		

Course no.	**AE 242**	
Course Title.	**ELEMENTS OF AERONAUTICS**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	None	
Course Description.	**UNITI HISTORICALEVALUATION** Early airplanes, biplanes and monoplanes, Developments in aerodynamics, materials, Structures and propulsion over the years. **UNITII AIRCRAFTCONFIGURATIONS** Components of an airplane and their functions. Different types of flight vehicles, classifications. Conventional control, Powered control, Basic instruments for flying, typical systems for control Actuation. **UNIT III INTRODUCTION TO PRINCIPLESOFFLIGHT** Physical properties and structure of the atmosphere ,Temperature ,pressure and altitude Relationships, Evolution of lift ,drag and moment. Aero foils , Mach number, Maneuvers.	

	UNIT IV INTRODUCTION TOAIRPLANESTRUCTURES General types of construction, Monologue, semi-monologue and geodesic construction, Typical wing and fuselage structure. Landing Gear Structure **UNITV POWERPLANTSUSEDINAIRPLANES** Basic ideas about piston, turbo prop and jet engines ,Use of propeller and jets for thrust Production. Comparative merits, Principles of operation of rocket, types of rockets and typical Applications, Exploration into space. **TEXT BOOK** 1. Anderson,J.D.,"IntroductiontoFlight",McGraw-Hill,1995. **REFERENCE** 1. Kermode,A.C.,"FlightwithoutFormulae",McGraw-Hill,1997.

Course no.	**ME 243**	
Course Title.	**Measurements and Instrumentation**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**GE235,GS112**	
Course Description.		

Course no.	**GE 244**	
Course Title.	**Engineering Materials**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**None**	
Course Description.		

Course no.	**GE 245**	
Course Title.	**Fluid Mechanics**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**GE234,GE236**	
Course Description.		

Course no.	**GS 246**	
Course Title.	**NUMERICAL METHODS**	
Credit.	**3Credit**	**Hours per week.(2 Lec+1Tut+0lab)**
Prerequisite.	**GS232,GS124**	
Course Description.		

Course no.	**AE 247**
Course Title.	**AIRCRAFT MATERIALS**
Credit.	**3Credit** **Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**GE 233**
Course Description.	**UNITI MECHANICAL BEHAVIOUR OF ENGINEERING MATERIALS** Knowledge of various types of hardness testing machines and various types of hardness numbers Linear and non-linear elastic properties-Stress and Strain Curves-Yield in g and strain Hardening ,Toughness - Modules of resilience -- Bauchinger's effect - Effect of notches - Testing and flaw detection of materials and components. **UNITII MATERIALS IN AIRCRAFT CONSTRUCTION-I** Aluminium and its alloys: Types and identification. Properties-Castings-Heat treatment processes- Surface treatments. Magnesium and its alloys: Cast and Wrought alloys - Aircraft application , features specification, fabrication problems, Special treatments. Titanium and its alloys: Applications, machining, forming, welding and heat treatment. **UNIT IIIMATERIALS IN AIRCRAFT CONSTRUCTION -II** Steels:Plain and low carbon steels, various low alloy steels ,aircraft steel specifications ,corrosion and heat resistant steels ,structural

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	applications. **Maraging Steels. Super Alloys:**Use-Nickelbase-Cobalt base-Iron base-Forging and Casting of Super alloys- Welding ,Heat treatment. **UNIT IV AD HESIVE AND SEALANTSFORAIRCRAFT** Advantages of Bonded structure in airframes - Crack arresting - Weight saving - Technology of adhesive Bonding Structural adhesive materials - Test for bonding structure Typical bonded joints &non destructive tests for bonded joint Bonded Sandwich structures - Materials - Methods of construction of honeycombs **UNITV NONMETALSINAIRCRAFTCONSTRUCTION** Wood and fabric in aircraft construction and specifications-Glues Use of glass ,plastics and rubber in aircraft ,Introduction to glass and carbon composite. **TEXT BOOKS** 1. LalithGupta,"AircraftGeneralEngineering"HimalayaBookHouse,Delhi2003 2. HajiraChowdhry,"Workshop Technology"-Vol1&2,NediaPromoters,Mumbai **REFERENCE** 1. "AircraftMaterial&Process",Titterton2004 2. "AdvancedCompositeMaterials",LalithGupta2006,HimalayaBookHouse,Delhi.

5. FIFTH SEMESTER

Course no.	**AE 351**	
Course Title.	**PROPULSION - I**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**ME245**	
Course Description .	**UNIT I FUNDAMENTALS OF GAS TURBINE ENGINES** Illustration of working of gas turbine engine - Thrust equation - Factors affecting thrust. Effect of pressure, velocity and temperature changes of air entering compressor. Methods of thrust augmentation. Characteristics of turboprop, turbofan and turbojet - Performance characteristics. **UNIT II SUBSONIC AND SUPERSONIC INLETS FOR JET ENGINES** Internal flow and Stall in subsonic inlets - Boundary layer separation - Major features of external flow near a subsonic inlet - Relation between	

	minimum area ratio and external deceleration ratio - Diffuser performance - Supersonic inlets - Starting problem on supersonic inlets - Shock swallowing by area variation - External declaration - Modes of inlet operation. **UNIT III COMBUSTION CHAMBERS** Classification of combustion chambers - Important factors affecting combustion chamber design - Combustion process - Combustion chamber performance - Effect of operating variables on performance-Flame tube cooling - Flame stabilization - Use of flame holders. **UNIT IV NOZZLES** Theory of flow in isentropic nozzles - Convergent nozzles and nozzle choking - Nozzle throat conditions-Nozzle efficiency - Losses in nozzles - Over expanded and under expanded nozzles - Ejector and variable area nozzles - Interaction of nozzle flow with adjacent surfaces - Thrust reversal. **UNIT V COMPRESSORS** Principle of operation of centrifugal compressor - Work done and pressure rise - Velocity diagrams - Diffuser vane design considerations - Concept of prewhirl - Rotation stall - Elementary theory of axial flow compressor - Velocity triangles - degree of reaction - Three dimensional - Air angle distributions for free vortex and constant reaction designs - Compressor blade design - Centrifugal and Axial compressor performance characteristics. **TEXT BOOK** 1. Hill,P.G.&Peterson,C.R."Mechanics&ThermodynamicsofPropulsion"Addison-WesleyLongman INC,1999. **REFERENCES** 1. Cohen,H.Rogers,G.F.C.andSaravanamuttoo,H.I.H."GasTurbineTheory",Longman,1919. 2. Oates,G.C.,"AerothermodynamicsofAircraftEngineComponents",AIAAEducationSeries, New York,1915. 3. "RollsRoyceJetEngine"-ThirdEdition-1913.Mathur,M.L.andSharma,R.P.,"GasTurbine,JetandRocketPropulsion",StandardPublishers &Distributors,Delhi,1999.

Course no.	**ME 352**	
Course Title.	**Strength of materials**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**ME 236,GE 244**	
Course		

Description.	

Course no.	**AE 353**	
Course Title.	**HEAT TRANSFER**	
Credit.	**3Credit**	**Hours per week.(?Lec+?Tut+?lab)**
Prerequisite.	**GE 234**	
Course Description.	Introduction to modes of Heat Transfer, Basic equations. Conduction: introduction, steady state and transient conduction in different co-ordinates, extended surfaces. Convective heat transfer: Newton's law of cooling and significance of heat transfer coefficients, momentum and energy equation in 2-D, Non – dimensional quantities in heat transfer, Analysis of flow, Boundary layer concepts. Coutte flow and Poiseullie flow, Concept of developing and developed flow, Introduction to the concept of similarity. Natural convection over a vertical plate. Concept and correlation. Radiation heat transfer: Physical mechanism of thermal radiation, laws of radiation, exchange between black and gray surfaces, radiation analysis. Introduction to heat exchangers: types and applications. **PRACTICAL:** • Thermal conductivity of solids. • Thermal conductivity of liquids and gases. • natural and forced convection. • boiling heat transfer. • cooling tower. • Experiments on emissivity and absurdity. Study of Heat exchangers. **TEXT BOOKS** 1. YunusA.Cengel.,"HeatTransfer-Apracticalapproach",SecondEdition,TataMcGraw-Hill, 2002. 2. Incropera.F.P.andDewitt.D.P."IntroductiontoHeatTransfer",JohnWileyandSons-2002. **REFERENCES** 1. Lienhard,J.H.,"AHeatTransferTextBook",PrenticeHallInc.,1911. 2. Holman,J.P."HeatTransfer",McGraw-HillBookCo.,Inc.,NewYork,6thEdn.,1991. 3. Sachdeva,S.C.,"Fundamentals of Engineering Heat &Mass Transfer",WileyEasternLtd., NewDelhi,1911.Mathur, M. and Sharma, R.P. "Gas Turbine and Jet and Rocket Propulsion", Standard Publishers,NewDelhi1911.	

Course no.	**AE 354**	
Course Title.	**AIRCRAFT SYSTEMS AND INSTRUMENTS**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+1lab)**
Prerequisite.	**AE 242 ME 245**	
Course Description.	**UNIT I AIR PLANE CONTROL SYSTEMS** Conventional Systems - Power assisted and fully powered flight controls - Power actuated systems-Engine control systems - Push pull rod system, flexible push pull rod system - Components - Modern control systems - Digital fly by wire systems - Auto pilot system active control Technology, Communication and Navigation systems Instrument landing systems, VOR - CCV case studies. **UNIT II AIRCRAFT SYSTEMS** Hydraulic systems - Study of typical workable system - components- Hydraulic system controllers Modes of operation - Pneumatic systems - Advantages - Working principles - Typical Air pressure system - Brake system - Typical Pneumatic power system - Components, Landing Gear systems - Classification - Shock absorbers - Retractive mechanism. **UNIT III ENGINE SYSTEMS** Fuel systems for Piston and jet engines, - Components of multi engines. lubricating systems for piston and jet engines - Starting and Ignition systems - Typical examples for piston and jet engines **UNIT IV AUXILLIARY SYSTEM** Basic Air cycle systems - Vapour Cycle systems, Boost-Strap air cycle system - Evaporative vapor cycle s **UNIT V AIRCRAFT INSTRUMENTS** Flight Instruments and Navigation Instruments - Gyroscope - Accelerometers, Air speed Indicators - TAS, EAS- Mach Meters - Altimeters - Principles and operation - Study of various types of engine instruments - Tachometers - Temperature gauges - Pressure gauges - Operation and Principles. **TEXT BOOKS** 1. McKinley,J.L.,andBent,R.D.,"AircraftMaintenance&Repair",McGraw-Hill,1993. 2. "GeneralHandBooksofAirframeandPowerplantMechanics",U.S.Dept.of Transportation, FederalAviationAdministration,TheEnglishBookStore,NewDelhi1995. **REFERENCES** 1. Mekinley,J.L.andBent,R.D.,"AircraftPowerPlants",McGraw-Hill,1993.	

	2. Pallet,E.H.J.,"AircraftInstruments&Principles",Pitman&Co.,1993. 3. Treager,S.,"GasTurbineTechnology",McGraw-Hill,1997.

Course no.	**AE 355**	
Course Title.	**Composite Materials and Structures**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**ME 244,AE 247**	
Course Description.	**UNIT I STRESS STRAIN RELATIO** Introduction- Advantages and application of composite materials, reinforcements and matrices - Generalised Hooke's Law - Elastic constants for anisotropic, orthotropic and isotropic materials. **UNIT II METHODS OF ANALYSI** Micro mechanics-Mechanics of materials approach, elasticity approach to determine material properties - Macro Mechanics - Stress-strain relations with respect to natural axis, arbitrary axis - Determination of material properties. Experimental characterization of lamina. **UNIT III LAMINATED PLATES** Governing differential equation for a general laminate, angle ply and cross ply laminates. Failure criteria for composites. **UNIT IV SANDWICH CONSTRUCTION** Basic design concepts of sandwich construction -Materials used for sandwich construction - Failure modes of sandwich panels. **FABRICATION PROCESS** Various Open and closed mould processes. Manufacture of fibers - Types of resins and properties and applications - Netting analysis. **TEXT BOOKS** 1. Calcote,LR."The Analysis of laminated Composite Structures", Von - NoastrandReinhold Company, New York 1991. 2. Jones,R.M.,"MechanicsofCompositeMaterials",McGraw-Hill,KogakushaLtd.,Tokyo,1915. **REFERENCES** 1. Agarwal,B.D.,andBroutman,L.J.,"AnalysisandPerformanceofFibreComposites",John Wiley and sons.Inc., New York,1995. 2. Lubin, G., "Handbook on Advanced Plastics and Fibre Glass", Von Nostrand ReinholdCo., New York,1919.	

Course no.	**AE356**	
Course Title.	**AERODYNAMICS – I**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**GE 245**	
Course Description.	**UNIT I REVIEW OF BASIC FLUID MECHANICS** Continuity, momentum and energy equations **UNIT II TWO DIMENSIONAL FLOWS** Basic flows - Source, Sink, Free and Forced vortex, uniform parallel flow. Their combinations ,Pressure and velocity distributions on bodies with and without circulation in ideal and real fluid flows. KuttaJou-kowski's theorem. **UNIT III CONFORMAL TRANSFORMATION** Joukowski transformation and its application to fluid flow problems, Kutta condition, Blasius theorem. **UNIT IV AIRFOIL AND WING THEORY** Joukowski, Karman - Thefts, Profiles - Thin aero foil theory and its applications. Vortex line, Horse shoe vortex, Biot and Savart law, Lifting line theory and its limitations **VISCOUS FLOW** Newton's law of viscosity, Boundary Layer, Navier-Stokes equation, displacement, Momentum thickness, Flow over a flat plate, Blasins solution. **TEXT BOOKS** 1. Anderson,J.D.,"FundamentalsofAerodynamics",McGraw-HillBookCo.,NewYork,1985. **REFERENCES** 1. Houghton,E.L.,andCarruthers,N.B.,"AerodynamicsforEngineeringstudents",EdwardArnold PublishersLtd.,London,1989. 2. MilneThomson,L.H.,"Theoreticalaerodynamics",Macmillan,1985. 3. Clancey,L.J.,"Aerodynamics",Pitman,1986.	

Course no.	**AE 357**
Course Title.	**MECHANICS OF MACHINES**

Credit.	**4 Credit**	**Hours per week.(2Lec+1Tut+2lab)**
Prerequisite .	**GE 236**	
Course Description.	**UNIT I MECHANISMS** Machine Structure - Kinematic link, pair and chain - Grumblers' criteria - Constrained motion - Degrees of freedom - Slider crank and crank rocker mechanisms - Inversions - Applications - Kinematic analysis of simple mechanisms - Determination of velocity and acceleration. **UNIT II FRICTION** Friction in screw and nut - Pivot and collar - Thrust bearing - Plate and disc clutches - Belt (flat and V) and rope drives. Ratio of tensions - Effect of centrifugal and initial tension - Condition for maximum power transmission - Open and crossed belt drive. **UNIT III GEARING AND CAMS** Gear profile and geometry - Nomenclature of spur and helical gears - Gear trains: Simple, compound gear trains and epicyclical gear trains - Determination of speed and torque - Cams - Types of cams - Design of profiles - Knife edged, flat faced and roller ended followers with and without offsets for various types of follower motions **UNIT IV BALANCING** Static and dynamic balancing - Single and several masses in different planes -Balancing of reciprocating masses- primary balancing and concepts of secondary balancing - Single and multi-cylinder engines (Inline) - Balancing of radial V engine - direct and reverse crank method **UNIT V VIBRATION** Free, forced and damped vibrations of single degree of freedom systems - Force transmitted to supports - Vibration isolation - Vibration absorption - Torsional vibration of shaft - Single and multi-rotor systems - Geared shafts - Critical speed of shaft. **TEXT BOOKS** 1. Rattan.S.S,"TheoryofMachines",TataMcGraw-HillPublishingCo,NewDelhi,2004. 2. Ballaney.P.L,"TheoryofMachines",KhannaPublishers,NewDelhi,2002. **REFERENCES** 1. Rao,J.SandDukkipati,R.V,"MechanismandMachineTheory",SecondEdition,WileyEastern Ltd.,1992. 2. Malhotra, D.R and Gupta, H.C., "The Theory of Machines", SatyaPrakasam, Tech. India Publications,1989. 3. Gosh, A. and Mallick, A.K., "Theory of Machines and Mechanisms", Affiliated East West Press,1989. 4. Shigley,J.E.andUicker,J.J.,"TheoryofMachinesandMechanisms",McGraw-Hill,1980. 5. BurtonPaul,"KinematicsandDynamicofPlanerMachinery",PrenticeHall	

6.SEXTH SEMESTER

Course no.	**ME 361**	
Course Title.	**Engineering Economy and Financial Management**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**None**	
Course Description.		

Course no.	**AE 362**	
Course Title.	**AERODYNAMICS - II**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**AE 356**	
Course Description.	**UNIT I ONE DIMENSIONAL COMPRESSIBLE FLOW** Energy, Momentum, continuity and state equations. Velocity of sound, Adiabatic steady state flow equations, Flow through converging, diverging passages. Performance under various back pressures. **UNIT II NORMAL, OBLIQUE SHOCKS AND EXPANSION WAVES** Prandtl equation and Rankine - Hugonoit relation, Normal shock equations, Pitot static tube, corrections for subsonic and supersonic flows, Oblique shocks and corresponding equations. Hodograph and pressure turning angle, shock polars, flow past wedges and concave corners, strong, weak and detached shocks, Rayleigh and Fanno Flow. Flow past convex corners, Expansion hodograph, Reflection and interaction of shocks and expansion waves, Families of shocks, Methods of Characteristics, Two dimensional supersonic nozzle contours. **UNIT III DIFFERENTIAL EQUATIONS OF MOTION FOR STEADY COMPRESSIBLE FLOWS** Small perturbation potential theory, solutions for supersonic flows, Mach waves and Mach angles, Prandtl-Glauert affine transformation relations for subsonic flows, Linearised two dimensional supersonic flow theory, Lift, drag pitching moment and center of pressure of supersonic profiles. **UNIT IV AIRFOIL IN HIGH SPEED FLOWS** Lower and upper critical mach numbers, Lift and drag divergence, shock induced separation, Characteristics of swept wings, Effects of thickness, camber and aspect ratio of wings, Transonic area rule, Tip effects. **UNIT V HIGH SPEED WIND TUNNELS** Blow down, in draft and induction tunnel layouts and their design	

	features. Transonic, supersonic and hypersonic tunnels and their peculiarities. Helium and gun tunnels, Shock tubes, Optical methods of flow visualization. **TEXT BOOK** 1. Rathakrishnan,E.,"GasDynamics",PrenticeHallofIndia,2003. **REFERENCES** 1. Shapiro,A.H.,"DynamicsandThermodynamicsofCompressibleFluidFlow",RonoldPress, 1912. 2. Zucrow,M.J.andAnderson,J.D.,"Elementsofgasdynamics",McGraw-HillBookCo.,New York,1919. 3. McCornick.W.,"Aerodynamics,AeronauticsandFlightMechanics",JohnWiley,NewYork, 1979. 4. AndersonJr.,D.,-"Moderncompressibleflows",McGraw-HillBookCo.,NewYork1999.

Course no.	**AE 363**	
Course Title.	**AIRCRAFT STRUCTURES - I**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**AE 356**	
Course Description.	**UNIT I STATICALLY DETERMINATE STRUCTURES** Analysis of plane truss - Method of joints - 3 D Truss - Plane frames **UNIT II STATICALLY INDETERMINATE STRUCTURES** Composite beam - Clapeyron's Three Moment Equation - Moment Distribution Method. **UNIT III ENERGY METHODS** Strain Energy due to axial, bending and Torsional loads - Castigliano's theorem - Maxwell's Reciprocal theorem, Unit load method - application to beams, trusses, frames, rings, etc. **UNIT IV COLUMNS** Columns with various end conditions - Euler's Column curve - Rankine's formula - Column with initial curvature - Eccentric loading - South well plot - Beam column. **UNIT V FAILURE THEORY** Maximum Stress theory - Maximum Strain Theory - Maximum Shear Stress Theory - Distortion Theory - Maximum Strain energy theory - Application to aircraft Structural problems. **TEXT BOOK** 1.Donaldson,B.K.,"AnalysisofAircraftStructures-AnIntroduction",McGraw-	

	Hill,1993. **REFERENCE** 1.Timoshenko,S.,"StrengthofMaterials",Vol.IandII,PrincetonD.VonNostrandCo,1990

Course no.	**ME 364**	
Course Title.	**Mechatronics and Modern Control**	
Credit.	**3Credit**	**Hours per week.(?Lec+?Tut+?lab)**
Prerequisite.	**AE 354**	
Course Description.		

Course no.	**AE 365**	
Course Title.	**VIBRATIONS AND AROELASTICITY**	
Credit.	**3Credit**	
Prerequisite.	**ME 236**	
Course Description.	**UNIT I BASIC NOTIONS** Simple harmonic motion - Terminologies - Newton's Law - D' Alembert's principle - Energy Methods **UNIT II SINGLE DEGREE OF FREEDOM SYSTEMS** Free vibrations - Damped vibrations - Forced Vibrations, with and without damping - support excitation- Vibration measuring instruments. **UNIT III MULTI DEGREES OF FREEDOM SYSTEMS** Two degrees of freedom systems - Static and Dynamic couplings vibration absorber- Principal co- ordinates, Principal modes and orthogonal condition - Eigen value problems. Hamilton's principle- Lagrangean equation and application - Vibration of elastic bodies- Vibration of strings- Longitudinal, Lateral and Torsional vibrations. **UNIT IV APPROXIMATE METHODS** Rayleigh's and Holzer Methods to find natural frequencies. **UNIT V ELEMENTS OF AEROELASTICITY** Concepts - Coupling - Aero elastic instabilities and their prevention - Basic ideas on wing divergence, loss and reversal of aileron control - Flutter and its prevention. **TEXT BOOKS**	

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1. TIMOSHENKO S., "Vibration Problems in Engineering"- John Wiley and Sons, New York, 1993.
2. FUNGY.C.,"AnIntroductiontotheTheoryofAeroelasticity"- JohnWiley&Sons,NewYork, 1995.

REFERENCES

.. BISPLINGHOFF R.L., ASHELY H and HOGMAN R.L., "Aero elasticity" - Addision Wesley Publication,NewYork,1913.
2. TSE.F.S.,MORSE,I.F.,HUNKLE,R.T.,"MechanicalVibrations",- PrenticeHall,NewYork, 1914.
3. SCANLANR.H.&ROSENBAUMR.,"IntroductiontothestudyofAi rcraftVibration&Flutter", JohnWileyandSons.NewYork,1912.
4. BENSONH.TONGUE,"PrinciplesofVibration",OxfordUniversity Press,2000.

Course no.	**AE 366**
Course Title.	**PROPULSION - II**
Credit.	**3 Credit**
Prerequisite.	**AE 351**
Course Description.	**UNIT I AIRCRAFT GAS TURBINES** Impulse and reaction balding of gas turbines - Velocity triangles and power output – Elementary theory-Vortex theory - Choice of blade profile, pitch and chord - Estimation of stage performance- Limiting factors in gas turbine design- Overall turbine performance - Methods of blade cooling -Matching of turbine and compressor - Numerical problems. **UNIT II RAMJET PROPULSION** Operating principle - Sub critical, critical and supercritical operation - Combustion in ramjet Engine - Ramjet performance - Sample ramjet design calculations - Introduction to scramjet Preliminary concepts in supersonic combustion - Integral ram-rocket- Numerical problems. **UNIT III FUNDAMENTALS OF ROCKET PROPULSION** Operating principle - Specific impulse of a rocket - Rocket nozzle

	classification - Rocket performance considerations - Numerical Problems. **UNIT IV CHEMICAL ROCKETS** Solid propellant rockets - Selection criteria of solid propellants - Important hardware components of solid rockets - Propellant grain design considerations - Liquid propellant rockets- Selection of liquid propellants - Thrust control in liquid rockets - Cooling in liquid rockets -Limitations of hybrid rockets- Relative advantages of liquid rockets over solid rockets- Numerical Problems. **UNIT V ADVANCED PROPULSION TECHNIQUES** Electric rocket propulsion - Ion propulsion techniques - Nuclear rocket - Types - Solar sail- Preliminary Concepts in nozzle less propulsion. **TEXT BOOKS** 1. Sutton, G.P., "Rocket Propulsion Elements", John Wiley & Sons Inc., New York, 5thEdn., 1993. 2. Hill,P.G.&Peterson,C.R."Mechanics&ThermodynamicsofPropulsion"Addison-Wesley Longman INC,1999. **REFERENCES** 1. Cohen,H.,Rogers,G.F.C.andSaravanamuttoo,H.I.H.,"GasTurbineTheory",LongmanCo., ELBS Ed.,1919. 2. Gorden,C.V.,"AerothermodynamicsofGasTurbineandRocket Propulsion",AIAAEducation Series, NewYork, 1919. 3. Mathur, M., and Sharma, R.P., "Gas Turbines and Jet and Rocket Propulsion", Standard Publishers,NewDelhi,1911.

Course no.	**AE 367**	
Course Title.	**ELECTIVE**	
Credit.	**2Credit**	**Hours per week.(2Lec+0Tut+0lab)**
Prerequisite.	**None**	
Course Description.		

7.SEVENTH SEMESTER

Course no.	**AE 471**	
Course Title.	**AIRCRAFT STRUCTURES - II**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**AE 363**	
Course Description.	**UNIT I UNSYMMETRICAL BENDING** Bending stresses in beams of unsymmetrical sections - Bending of symmetric sections with Skew loads. **UNIT II SHEAR FLOW IN OPEN SECTIONS** Thin walled beams, Concept of shear flow, shear centre, Elastic axis. With one axis of Symmetry, with wall effective and ineffective in bending, unsymmetrical beam sections. **UNIT III SHEAR FLOW IN CLOSED SECTIONS** Bredt - Batho formula, Single and multi-cell structures. Approximate methods. Shear flow in single & multi cell structures under torsion. Shear flow in single and multicell under bending with walls effective and ineffective. **UNIT IV BUCKLING OF PLATES** Rectangular sheets under compression, Local buckling stress of thin walled sections, Crippling stresses by Needham's and Gerard's methods. Thin walled column strength. Sheet stiffener panels. Effective width, inter rivet and sheet wrinkling failures. **UNIT V STRESS ANALYSIS IN WING AND FUSELAGE** Shear and bending moment distribution for semi cantilever and other types of wings and Fuselage, thin webbed beam. With parallel and non-parallel flanges, Shear resistant web beams, Tension field web beams (Wagner's). **TEXT BOOK** 1. Bruhn.E.H."Analysis and Design of Flight vehicles Structures",Tri-stateoffset company, USA,1973. **REFERENCES** 1. Peery,D.J.,andAzar,J.J.,"AircraftStructures",2ndedition,McGraw-Hill,N.Y.,1993. 2. Megson,T.M.G.,"Aircraft Structures for Engineering Students", Edward Arnold,1995. Rivello,R.M.,"TheoryandAnalysisofFlightStructures",McGraw-Hill,1993.	

Course no.	**AE 472**
Course Title.	**TEMPERATUREMATERIALS**

Credit.	3Credit	Hours per week.(2Lec+0Tut+2lab)
Prerequisite.	AE 367	
Course Description.		

UNITI CREEP

Factors in flouncing functional life of component sat elevated temperatures, definition of creep curve, variousstagesofcreep,metallurgicalfactorsinfluencingvariousstages,effectofstress,temperature and strain rate.

UNIT II DESIGN FORCREEPRESISTANCE

Design of transient creep time, hardening, strain hardening, expressions of rupture life of creep, ductile and brittle materials, Monkman-Grant relationship.

UNITIII FRACTURE

Varioustypesoffracture,brittletoductilefromlowtemperaturetohightemperature, cleavagefracture, andductilefractureduetomicrovoidcoalescence-diffusioncontrolledvoidgrowth¡fracturemapsfor different alloys and oxides.

UNIT IV OXIDATION ANDHOTCORROSION

Oxidation, Pilling, Bed worth ratio ,kinetic awes of oxidation-defect structure and control of oxidation by alloy additions ,hot gas corrosion deposit, modified hot gas corrosion ,fluxing mechanisms ,effect of alloying elements on hot corrosion, interaction of hot corrosion and creep ,methods of combat hot corrosion.

UNIT V SUPERALLOYS ANDOTHER MATERIALS

Iron base, Nickel base and Cobalt base super alloys ,composition control ,solid solution strengthening, precipitation hardening by gamma prime ,grain boundary strengthening, TCP phase ,embrittlement, solidification of single crystals, Intermetallics ,high temperature ceramics.

TEXT BOOKS

1. Raj.R.,"FlowandFractureatElevatedTemperatures",AmericanSocietyfor Metals,USA, 1915.
2. HertzbergR.W.,"DeformationandFractureMechanicsofEngineeringmaterials",4thEdition, John Wiley, USA,1996.
3. CourtneyT.H,"MechanicalBehaviorofMaterials",McGraw-Hill,USA,1990.

REFERENCES

1. BoyleJ.T,SpencerJ,"StressAnalysisforCreep",Butterworths,UK,1913.
2. Bressers.J.,"CreepandFatigueinHighTemperatureAlloys",AppliedScience,1911.
3. McLeanD.,"DirectionallySolidifiedMaterialsforHighTemperatureService",T

	heMetalsSociety, USA,1915.

Course no.	**AE 473**	
Course Title.	**FLIGHT DYNAMICS**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**AE 356 ,AE364**	
Course Description.	**DRAG ON THE AIRPLANE** International Standard Atmosphere - Forces and moments acting on a flight vehicle - Equation of motion of a rigid flight vehicle - Different types of drag - Drag polars of vehicles from low speed to high speed - Variation of thrust, power and SFC with velocity and altitudes for air breathing engines and rockets - Power available and power required curves. **AIRCRAFT PERFORMANCE** Performance of airplane in level flight - Maximum speed in level flight - Conditions for minimum drag and power required - Range and endurance - Climbing and gliding flight (Maximum rate of climb and steepest angle of climb, minimum rate of sink and shallowest angle of glide) -Turning performance (Turning rate, turn radius). Bank angle and load factor, Limitations of pull up and push over, V-n diagram and load factor. **STATIC LONGITUDINAL STABILITY** Degree of freedom of rigid bodies in space - Static and dynamic stability - Purpose of controls in airplanes -Inherently stable and marginal stable airplanes - Static Longitudinal stability - Stick fixed stability - Basic equilibrium equation - Stability criterion - Effects of fuselage and nacelle - Influence of CG location - Power effects - Stick fixed neutral point - Stick free stability-Hinge moment coefficient-Stick free neutral points-Symmetric manoeuvres - Stick force gradients - Stick force per 'g' - Aerodynamic balancing. Determination of neutral points and maneuvers points from flight test. **LATERAL AND DIRECTIONAL STABILITY** Dihedral effect - Lateral control - Coupling between rolling and yawing moments - Adverse yaw effects-Aileron reversal - Static directional stability - Weather cocking effect - Rudder requirements - One engine inoperative condition - Rudder lock. **DYNAMIC STABILITY** Dynamic longitudinal stability: Equations of motion - Stability derivatives - Characteristic equation of stick fixed case - Modes and stability criterion - Effect of freeing-the stick - Brief description of lateral and directional. Dynamic stability - Spiral, divergence, Dutch roll, auto rotation and spin.	

	TEXT BOOK 1. Perkins, C.D., and Hage, R.E., "Airplane Performance stability and Control", JohnWiley&Son:, Inc, New York,1911. **REFERENCES** 1. Etkin, B., "Dynamics of Flight Stability and Control", Edn. 2, John Wiley, NewYork, 1912. 2. Babister,A.W.,"AircraftDynamicStabilityandResponse",PergamonPress, Oxford,1910. 3. Dommasch,D.O.,Shelby,S.S.,andConnolly,T.F.,"AeroplaneAerodynamics",ThirdEdition, 4. IssacPitman,London,1911.4.Nelson,R.C."FlightStabilityandAutomaticControl",McGraw- Hill Book Co.,1991

Course no.	**AE 474**	
Course Title.	**ELECTIVE)**	
Credit.	**2 Credit**	**Hours per week.(2Lec+0Tut+0lab)**
Prerequisite.	**AE 367**	
Course Description.		

Course no.	**AE 475**	
Course Title.	**AIRCRAFT ENGINE DESIGN**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**AE 366**	
Course Description.	Turbine aviation engines: scope of using, design schemas, overview of units, aerothermodynamics calculations techniques. Short overview of basic design problems, overview basic responsibilities of control, diagnostic and monitoring unit. Guided, individual or group project of aircraft engines or its elements,the maintenance and repair procedures of both Piston and Gas Turbine Engines and their procedures followed for overhaul of aero engines.	

Course no.	**AE 476**	
Course Title.	**CONTROL ENGINEERING**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+1lab)**
Prerequisite.	**AE 364**	
Course Description.	**INTRODUCTION** Historical review - Simple pneumatic, hydraulic and thermal systems, Series and parallel systems, Analogies - Mechanical and electrical components, Development of flight control systems. **OPEN AND CLOSED LOOP SYSTEMS** Feedback control systems - Block diagram representation of control systems, Reduction of block diagrams, Output to input ratios, Signal flow graph. **CHARACTERISTIC EQUATION AND FUNCTIONS** Laplace transformation, Response of systems to different inputs viz., Step input, impulse, ramp, parabolic and sinusoidal inputs, Time response of first and second order systems, steady state errors and error constants of unity feedback circuit. **CONCEPT OF STABILITY** Necessary and sufficient conditions, Routh - Hurwitz criteria of stability, Root locus and Bode techniques, Concept and construction, frequency response. **SAMPLED DATA SYSTEMS** Introduction to digital control system, Digital Controllers and Digital PID Controllers. **TEXT BOOKS** 1. OGATO,"ModernControlEngineering",Prentice-HallofIndiaPvt.Ltd.NewDelhi,1991. 2. GOPAL.M. "Control Systems, Principles and design" - Tata McGraw-Hill Publication, New Delhi,2000. **REFERENCES** 1. Azzo,J.J.D.andC.H.Houpis,"Feedbackcontrolsystemanalysisandsynthesis",McGraw - Hill International, 3rd Edition, 1998. 2. Kuo,B.C.,"Automaticcontrolsystems",Prentice-HallofIndiaPvt.Ltd.,NewDelhi,1998. 3. Houpis,C.H.andLamont,G.B.,"DigitalControlSystems",McGraw-HillBookCo.NewYork, USA1995. NareshK.Sinha,"ControlSystems",NewAgeInternationalPublishers,NewDelhi	

Course no.	**AE 400 - I**	
Course Title.	**Project -I**	
Credit.	**SCredit**	**Hours per week.(SLec+STut+Slab)**
Prerequisite.	**AE 366 AE 363**	
Course Description.		

8.Eighth SEMESTER

Course no.	**AE 481**	
Course Title.	**AVIONICS**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**None**	
Course Description.	**INTRODUCTION TO AVIONICS** Need for Avionics in civil and military aircraft and space systems - Integrated Avionics and Weapon system - Typical avionics sub systems - Design and Technologies. **PRINCIPLES OF DIGITAL SYSTEMS** Digital Computers - Microprocessors - Memories **DIGITAL AVIONICS ARCHITECTURE** Avionics system architecture-Data buses MIL-STD 1553-B, ARINC 429-ARINC 629. **FLIGHT DECK AND COCKPITS** Control and display technologies CRT, LED, LCD, EL and plasma panel - Touch screen - Direct voice input (DVI) - Civil cockpit and military cockpit : MFDS, HUD, MFK, HOTAS **INTRODUCTION TO AVIONICS SYSTEMS** Communication Systems - Navigation systems - Flight control systems - Radar electronic Warfare - Utility systems Reliability and maintainability - Certification. **TEXT BOOKS** 1. MalcrnoA.P.andLeach,D.P.,"DigitalPrinciplesandApplication",TataMcGraw-Hill,1990. 2. Gaonkar, R.S., "Microprocessors Architecture - Programming and Application", Wiley and SonsLtd.,NewDelhi,1990.	

3. R.P.G.Collinson,"IntroductiontoAvionics",Chapman&HallPublications,1996.

REFERENCES

1. Middleton,D.H.,Ed.,"AvionicsSystems,LongmanScientificandTechnical",LongmanGroup UKLtd.,England,1919.
2. Spitzer,C.R.,"DigitalAvionicSystems",PrenticeHall,EnglewoodCliffs,N.J.,USA.,1917.
3. BrainKendal,"ManualofAvionics",TheEnglishBookHOuse,3rdEdition,NewDelhi,1993.

Course no.	**AE 482**	
Course Title.	**AIRCRAFT DESIGN**	
Credit.	**3Credit**	**Hours per week.(?Lec+?Tut+?lab)**
Prerequisite.	**AE 471**	

Course Description.

UNIT I REVIEW OF DEVELOPMENTS IN AVIATION

Categories and types of aircraft specifications - various configurations - Layouts and their relative merits - strength, stiffness, fail safe and fatigue requirements - Manoeuvering load factors - Gust and manoeuvrability envelopes - Balancing and maneuvering loads on tail planes.

UNIT II POWER PLANT TYPES AND CHARACTERISTICS

Characteristics of different types of power plants - Propeller characteristics and selection - Relative merits of location of power plant.

UNIT III PRELIMINARY DESIGN

Selection of geometric and aerodynamic parameters - Weight estimation and balance diagram - Drag estimation of complete aircraft - Level flight, climb, take - off and landing calculations - range and endurance - static and dynamic stability estimates - control requirements.

UNIT IV SPECIAL PROBLEMS

Layout peculiarities of subsonic and supersonic aircraft - optimisation - of wing loading to achieve desired performance - loads on undercarriages and design requirements.

UNIT V STRUCTURAL DESIGN

Estimation of loads on complete aircraft and components - Structural design of fuselage, wings and undercarriages, controls, connections and joints. Materials for modern aircraft - Methods of analysis, testing and fabrication.

REFERENCES

1. G. Corning, "Supersonic & Subsonic Airplane Design", II Edition,

Edwards Brothers Inc., Michigan,1953.
2. E.F. Bruhn, "Analysis and Design of Flight Vehicle Structures", Tristate Offset Co., U.S.A., 1980.
3. A.A.Lebedenski,"Notesonairplanedesign",Part-I,I.I.Sc.,Bangalore,1971.
4. E.Torenbeek,"SynthesisofSubsonicAirplaneDesign",DelftUniversityPress ,London,1976.
5. D.P.Raymer,"Aircraftconceptualdesign",AIAASeries,1988.
6. H.N.Kota, " Integrated design approach to Design fly by wire" Lecture notes Interline Pub. Bangalore,1992.
S.C.Keshu&K.K.Ganapathi"AircraftProductionTechniquesandManagement",1995.

Course no.	**AE 483**	
Course Title.	**COMPUTATIONAL FLUID DYNAMICS**	
Credit.	**3Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**None**	
Course Description.	**UNIT I FUNDAMENTAL CONCEPTS** Introduction - Basic Equations of Fluid Dynamics - Incompressible In viscid Flows: Source, vortex and doublet panel, methods - lifting flows over arbitrary bodies. Mathematical properties of Fluid Dynamics Equations -_ Elliptic, Parabolic and Hyperbolic equations - Well posed problems - discretization of partial Differential Equations -Transformations and grids - Explicit finite difference methods of subsonic, supersonic and viscous flows. **UNIT II PANEL METHODS** Introduction - Source panel method - Vortex panel method - Applications. **UNIT III DISCRETIZATION** Boundary layer Equations and methods of solution -Implicit time dependent methods for in viscid and viscous compressible flows - Concept of numerical dissipation --Stability properties of explicit and implicit methods - Conservative upwind discretization for Hyperbolic systems - Further advantages of upwind differencing. **UNIT IV FINITE ELEMENT TECHNIQUES** Finite Element Techniques in Computational Fluid Dynamics¡ introduction - Strong and Weak Formulations of a Boundary Value Problem - Strong formulation - Weighted Residual Formulation - Galerkin Formulation - Weak Formulation - Variational Formulation - Piecewise defined shape functions- Implementation of the FEM - The Solution Procedure. **UNIT V FINITE VOLUME TECHNIQUES**	

	Finite Volume Techniques - Cell Centered Formulation - ~ Lax - Vendoroff Time Stepping - Runge - Kutta Time Stepping - Multi - stage Time Stepping - Accuracy -. Cell Vertex Formulation - Multistage Time Stepping - FDM -like Finite Volume Techniques - Central and Up-wind Type Discretization - Treatment of Derivatives. **TEXT BOOK** 1. Fletcher, C.A.J., "Computational Techniques for Fluid Dynamics", Vols. I and II, Springer - Verlag, Berlin, 1911. **REFERENCES** 1. JohnF.Wendt(Editor),"ComputationalFluidDynamics-AnIntroduction",Springer-Verlag, Berlin,1992 2. CharlesHirsch,"NumericalComputationofInternalandExternalFlows",Vols.IandII.John Wiley &Sons, New York, 1911. 3. KlausAHoffmannandSteveT.Chiang."ComputationalFluidDynamicsfor Engineers",Vols. I&IIEngineeringEducationSystem,P.O.Box20071,W.Wichita,K.S.,67201-1071USA, 1993. 4. Anderson,Jr.D.,"FundamentalsofAerodynamics",McGraw-Hill,2000.

Course no.	**AE 484**	
Course Title.	**AIRCRAFT GENERAL ENGINEERING MAINTENANCE & PRACTICES**	
Credit.	**3Credit**	**Hours per week.(2Lec+0Tut+2lab)**
Prerequisite.	**AE 471**	
Course Description.	**AIRCRAFT GROUND HANDLING AND SUPPORT EQUIPMENT** Mooring, jacking, leveling and towing operations - Preparation - Equipment - precautions - Engine starting procedures - Piston engine, turboprops and turbojets - Engine fire extinguishing - Ground power units. **GROUND SERVICING OF VARIOUS SUB SYSTEMS** Air conditioning and pressurization - Oxygen and oil systems - Ground units and their maintenance. **MAINTENANCE OF SAFETY** Shop safety - Environmental cleanliness - Precautions. **INSPECTION** Process - Purpose - Types - Inspection intervals - Techniques - Checklist - Special inspection - Publications, bulletins, various manuals - FAR Air worthiness directives - Type certificate Data Sheets-ATA specifications. **AIRCRAFT HARDWARE, MATERIALS, SYSTEMS PROCESSES** Hand tools - Precision instruments - Special tools and equipments in an airplane maintenance shop-Identification terminology - Specification and	

	correct use of various aircraft hardware (i.e. nuts, bolts, rivets, screws etc.) - American and British systems of specifications - Threads, gears, bearings, etc. - Drills, tapes & reamers. - identification of all types of fluid line fittings. Materials, metallic and non-metallic - Plumbing Connectors - Cables - Swaging procedures, tests, Advantages of swaging over splicing. **TECHNOLOGY IN AIRCRAFT MAINTENANCE** Airlines scheduling (with reference to engineering) - Product support and spares - Maintenance sharing - Equipments and tools for aircraft maintenance - Aircraft weight control - Budgetary control.On board maintenance systems - Engine monitoring - Turbine engine oil maintenance - Turbine engine vibration monitoring in aircraft - Life usage monitoring - Current capabilities of NDT - Helicopter maintenance - Future of aircraft maintenance

Course no.	**AE 485**	
Course Title.	**Elective**	
Credit.	**2 Credit**	**Hours per week.(2Lec+1Tut+0lab**
Prerequisite.	**AE 475**	
Course Description.		

Course no.	**AE 400**	
Course Title.	**Project -II**	
Credit.	**6Credit**	**Hours per week.(2Lec+1Tut+4lab)**
Prerequisite.	**None**	
Course Description.		

مفردات المقررات الاختيارية

Course no.	**AE ???**	
Course Title.	**COMPUTERINTEGRATEDMANUFACTURING**	
Credit.	**2Credit**	**Hours per week.(2 Lec+?Tut+?lab)**
Prerequisite.	**None**	

Course Description.	**UNITI INTRODUCTION** The meaning and origin of CIM- the changing manufacturing and management scene - External communication-is landsofautomationandsoftware-dedicatedandopensystems-manufacturing automation protocol-productrelatedactivitiesofacompany-marketingengineering-production planning-plantoperations-physicaldistribution-businessandfinancialmanagement. **UNIT II GROUP TECHNOLOGY AND COMPUTER AIDED PROCESSPLANNING** History of group technology- role of G.T. inCAD/CAMinte gration-part families-classification and coding-DCLASSandMICLASSandOPITZcodingsystems-facilitydesignusingG.T.-benefitsof G.T. - cellular manufacturing. Processplanning-roleofprocessplanninginCAD/CAMintegration-approachestocomputeraided processplanning-variantapproachandgenerativeapproaches-CAPPandCMPPprocessplanning systems. **UNITIII SHOPFLOORCONTROLANDINTRODUCTIONOFFMS** Shop floor control-phases -factory data collection system -automatic identification methods- Bar code technology-automated data collection system. FMS-componentsofFMS-types-FMSworkstation-materialhandlingandstoragesystems-FMS layout-computer control systems-application and benefits. **UNIT IV CIM IMPLEMENTATION ANDDATACOMMUNICATION** CIMandcompanystrategy-systemmodelingtools-IDEFmodels-activitycyclediagramCIMopen system architecture (CIMOSA)- manufacturing enterprise wheel-CIM architecture- Product data management-CIM implementation software. Communication fundamentals- local area networks -topology -LAN implementations - network management and installations. **UNIT V OPEN SYSTEMAND DATABASE FORCIM** Opensystems-opensysteminterconnection-manufacturingautomationsprotocolandtechnical officeprotocol(MAP/TOP).Developmentofdatabases-databaseterminology-architecture of data base systems-data modeling and data associations-relational data bases-database operators-advantages of data base and relational data base. **TEXT BOOK** 1. Mikell.P.Groover"Automation,ProductionSystemsandcomputerintegrated

	manufacturing",PearsonEducation2001. **REFERENCES** 1. Yoremkoren,"ComputerIntegratedManufacturingSystem",McGraw-Hill,1913. 2. Ranky,PaulG.,"ComputerIntegratedManufacturing",PrenticeHallInternational,1916. 3. David D.Bedworth, Mark R.Hendersan, Phillip M.Wolfe "Computer Integrated Design and Manufacturing",McGraw-HillInc. 4. RogerHanman"ComputerIntergratedManufacturing",Addison-Wesley,1997.Mikell.P.GrooverandEmoryZimmersJr.,"CAD/CAM",Prentice HallofIndiaPvt.Ltd.,NewDelhi-1,1991. 5. KantVajpayeeS,"PrinciplesofComputerIntegratedManufacturing",PrenticeHallIndia,2003. 6. RadhakrishnanP, SubramanyanS. And RajuV., "CAD/CAM/CIM", 2nd Edition New Age International(P)Ltd.,NewDelhi,2000.

Course no.	**AE ???**	
Course Title.	**PROFESSIONALETHICSANDHUMANVALUES**	
Credit.	**2Credit**	**Hours per week.(2Lec+1Tut+0lab)**
Prerequisite.	**None**	
Course Description.	**UNIT I HUMANVALUES** Morals, Values and Ethics - Integrity - Work Ethic - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character - Spirituality **UNIT II ENGINEERINGETHICS** Senses of' Engineering Ethics'-variety of moral issued-types of inquiry-moral dilemmas-moral autonomy-Kohlberg'stheory-Gilligan'stheory-consensus an controversy-Models of Professional Roles-theoriesaboutrightaction-Self-interest-customsandreligion-usesofethicaltheories. **UNIT III ENGINEERING ASSOCIALEXPERIMENTATION** Engineering as experimentation - engineers as responsible experimenters -	

	codes of ethics - a balanced outlook on law - the challenger case study **UNIT IV SAFETY, RESPONSIBILITIESANDRIGHTS** Safety and risk-assessment of safety and risk-risk benefit analysis and reducing risk-the three mile island and Chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination. **TEXT BOOKS** 1. Mike Martin and Roland Schinzinger,"EthicsinEngineering",McGraw-Hill,NewYork1996. 2. GovindarajanM,NatarajanS,SenthilKumarV.S,"EngineeringEthics",PrenticeHallofIndia, NewDelhi,2004. **REFERENCES** 1. CharlesD.Fleddermann,"EngineeringEthics",PearsonEducation/Prentice Hall,NewJersey, 2004(Indian Reprint now available). 2. CharlesEHarris,MichaelS.ProtchardandMichaelJRabins,"Engineering Ethics-Concepts andCases",WadsworthThompsonLeatning,UnitedStates,2000(IndianReprintnowavailable) 3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003. 4. EdmundGSeebauerandRobertLBarry,"FundamentalsofEthicsforScientistsandEngineers", OxfordUniversityPress,Oxford,2001.

Course no.	**AE ???**	
Course Title.	**AE CIVILAVIATIONREQUIRMENTS-I**	
Credit.	**2Credit**	**Hours per week.(2Lec+1Tut+0lab)**

Prerequisite.	**None**
Course Description.	**UNIT IAIRCRAFT RULES 1937 AND RELATEDPUBLICATIONS** Knowledge of aircraftact,1934,aircraft rules,1937asfaras they related to air worthiness and safety of aircraft. Knowledge of civil airworthiness requirements, aeronautical information circulars, aeronautical information publications-(relatingtoairworthiness),advisorycirculars&A.M.E.notices (NOTAMS) by DGCA. **UNIT II C.A.R. SERIES "A"&"B"** C.A.R.seriesA-procedureforissueofcivilairworthinessrequirementsandresponsibilityofoperators vis-à-vis air worthiness directorate: Responsibilities of operators/owners¡ procedure of CAR issue, amendments etc¡ objectives and targetsofairworthinessdirectorate¡airworthinessregulationsandsafetyoversightofengineering activities of operations C.A.R. series "B" - issue approval of cockpit check list, MEL, CDL: Deficiency list (MEL & CDL)¡ preparation and use of cockpit check list and emergency check list. **UNIT III C.A.R.SERIES "C"** C.A.R.series'C'-defect recording , monitoring, investigation and reporting: Defect recording, reporting, investigation,rectificationandanalysis¡flightreport,recordingofin-flightinstrument,readingand reporting of flight defects and rectification of defects observed on aircraft. C.A.R. series 'D - and aircraft maintenance programs : Reliability programs (engines)¡aircraft maintenance programmers & their approval: on condition maintenance of reciprocating engines¡TBO-revision program. **UNIT IV C.A.R.SERIES"E"** C.A.R. Series E - approval of organizations: Approval of organizations in categories A, B, C, D, E, F, & G¡ requirements of infrastructure at stations other than parent base. **UNIT V C.A.R. SERIES"F"** C.A.R. Series "F" airworthiness and continued airworthiness: Procedurerelatingtoregistrationofaircraft¡procedureforissue/revalidationoftypecertificationof aircraftanditsengines/propellers¡issue/revalidationandrenewalofcertificateofairworthiness¡

	requireforrenewalofcertificateofairworthiness.Suspensionsofcertificateofairworthinessandits subsequentrevalidation¡rebuildingofaircraft,continuousairworthinessmaintenanceprogramme¡ airworthinessofageingaircraft¡controlsystem-duplicateinspection,Inspectionofwoodenaircraft¡ airworthinessrequirementsofgliders,requirementsofmanufacture,registration&airworthiness controlofhotairballoons¡approvalofflightmanualsandtheiramendments¡poolingofaircraftparts bynationalairlinesofIndiawithforeignairlinesconstruction,certificationandoperationofexperimental/amateurbuiltaircraft¡manufactureofaircraftandaccessoriesandairworthinesscertificationthereof¡ ageofaircrafttobeimportedforcharterhire"airtaxiandotheroperations",import/exportofaircraft, itemofequipmentetc.Foruseonaircraft¡loadandtrimsheet-requirementsthereof. **REFERENCE** 1. Aircraftmanual(India)volume-latestedition,theEnglishbookstore,17-1,Connaughtcircus, NewDelhi. 2. Civil aviation requirements with latest amendment (section 2 airworthiness) - published by DGCA,theEnglishbookstore,17-1,Connaughtcircus,NewDelhi. 3. Aeronauticalinformationcirculars(relatingtoairworthiness)fromDGCA.Advisorycirculars fromDGCA.

Course no.	**AE ???**	
Course Title.	**AIRCRAFT GENERAL ENGINEERING MAINTENANCE & PRACTICES**	
Credit.	**2Credit**	**Hours per week.(2 Lec+0Tut+1lab)**
Prerequisite.	**None**	
Course Description.	**UNITI AIRCRAFTGROUNDHANDLINGANDSUPPORTEQUIPMENT** Mooring,jacking,levellingandtowingoperations-Preparation-Equipment-precautions-Engine startingprocedures-Pistonengine,turbopropsandturbojets-Enginefireextinguishing-Ground powerunits. **UNITII GROUNDSERVICINGOFVARIOUSSUBSYSTEMS** Airconditioningandpressurization-Oxygenandoilsystems-Groundunitsandtheirmaintenance. **UNIT III MAINTENANCEOFSAFETY**	

	Shop safety - Environmental cleanliness - Precautions. **UNITIV INSPECTION** Process - Purpose - Types - Inspection intervals - Techniques - Checklist - Special inspection - Publications,bulletins,variousmanuals-FARAirworthinessdirectives-TypecertificateDataSheets ATAspecifications. Handtools-Precisioninstruments-Specialtoolsandequipmentsinanairplanemaintenanceshop - Identification terminology - Specification and correct use of various aircraft hardware (i.e. nuts, bolts,rivets,screwsetc.)-AmericanandBritishsystemsofspecifications-Threads,gears,bearings, etc.-Drills,tapes&reamers.-identificationofalltypesoffluidlinefittings.Materials,metallicand non-metallic-PlumbingConnectors-Cables-Swagingprocedures,tests,Advantagesofswaging oversplicing. **TEXT BOOK** 1. KROESWATKINSDELP,"AircraftMaintenanceandRepair"-McGraw-Hill,NewYork1993. **REFERENCES** 1. A&PMECHANICS,"AircrafthandBook"-F.A.A.HimalayanBookHouse,NewDelhi,1996. 2. A&PMECHANICS,"GeneralhandBook"-F.A.A.HimalayanBookHouse,NewDelhi,1996.

Course no.	**AE ???**	
Course Title.	**FINITEELEMENTMETHOD**	
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+0lab)**
Prerequisite.	**None**	
Course Description.	**UNITI INTRODUCTION** Reviewofbasicanalysis-StiffnessandFlexibilitymatrixforsimplecases-Governingequationand convergencecriteriaoffiniteelementmethod. **UNITII DISCRETEELEMENTS** Bar, Frame, beam elements - Application to static, dynamic and stability analysis.	

	UNIT III CONTINUUMELEMENTS Varioustypesof2-D-elementsApplicationtoplanestress,planestrainandax symmetricproblems. **UNIT IV ISOPARAMETRICELEMENTS** Applications to two and three-dimensional problems. **UNITV FIELDPROBLEM** Applications to other field problems like heat transfer and fluid flow. **TEXT BOOK** 1. Tirupathi.R. Chandrapatha and Ashok D. Belegundu, "Introduction to Finite ElementsinEngineering",PrenticeHallIndia,ThirdEdition,2003. **REFERENCES** 1. ReddyJ.N."AnIntroductiontoFiniteElementMethod",McGraw-Hill,2000. 2. Krishnamurthy,C.S.,"FiniteElementAnalysis",TataMcGraw-Hill,2000. 3. Bathe,K.J.andWilson,E.L.,"NumericalMethodsinFiniteElementsAnalysis",PrenticeHall ofIndia,1915.

Course no.	**AE ???**	
Course Title.	**AIR TRANSPORTAION AND AIRCRAFT MAINTENANCE**	
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**None**	
Course Description.	**UNITI INTRODUCTION** Developmentofairtransportation,comparisonwithothermodesoftransport-RoleofIATA,ICAO- Thegeneralaviationindustryairline-Factorsaffectinggeneralaviation,useofaircraft,airport:airline management and organisation - levels of management, functions of management, Principles of organisationplanningtheorganisation-chart,staffdepartments&linedepartments. **UNIT II AIRLINEECONOMICS** Forecasting - Fleet size, Fleet planning, the aircraft selection process, operating cost,passenger capacity,loadfactoretc.-Passengerfareandtariffs-Influenceofgeographical,economic&political factorsonroutesandrouteselection. FLEETPLANNING:Theaircraftselectionprocess-Fleetcommonality,factorsaffectingchoiceof fleet,routeselectionandCapitolacquisition-Valuation&Depreciation-	

	Budgeting,Costplanning- Aircrewevaluation-Routeanalysis-Aircraftevaluation. **UNIT III PRINCIPLES OFAIRLINESSCHEDULING** Equipment maintenance, Flight operations and crew scheduling, Ground operations and facility limitations,equipmentsandtypesofschedule-hub&spokescheduling,advantages/disadvantages &preparingflightplans-Aircraftschedulinginlinewithaircraftmaintenancepractices. **UNIT IV AIRCRAFTRELIABILITY** Aircraftreliability-Themaintenanceschedule&itsdeterminations-Conditionmonitoringmaintenance - Extended range operations (EROPS) & ETOPS - Ageing aircraft maintenance production. **UNIT V TECHNOLOGY INAIRCRAFTMAINTENANCE** Airlines scheduling (with reference to engineering) - Product support and spares - Maintenance sharing-Equipmentsandtoolsforaircraftmaintenance-Aircraftweightcontrol-Budgetarycontrol. On board maintenance systems - Engine monitoring - Turbine engine oil maintenance - Turbine enginevibrationmonitoringinaircraft-Lifeusagemonitoring-CurrentcapabilitiesofNDT-Helicopter maintenance-Futureofaircraftmaintenance. **TEXT BOOKS** 1. FEDRICJ.H.,"AirportManagement",2000. 2. C.H.FRIEND,"AircraftMaintenanceManagement",2000. **REFERENCES** 1. GENE KROPF, "AirlineProcedures". 2. WILSON&BRYON,"AirTransportation". 3. PHILIPLOCKLIND,"EconomicsofTransportation". 4. "IndianAircraftmanual"-DGCAPub. 5. ALEXANDER T WELLS, "Air Transportation", Wadsworth Publishing Company, California, 1993.

Course no.	**AE ???**

Course Title.	**AIRFRAMEMAINTENANCE&REPAIRPRACTIC**	
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**None**	
Course Description.	**UNITI WELDINGINAIRCRAFTSTRUCTURALCOMPONENTS** Equipmentsusedinweldingshopandtheirmaintenance-Ensuringqualitywelds-Weldingjigsand fixtures-Solderingandbrazing. **SHEET METAL REPAIR AND MAINTENANCE** Inspection of damage - Classification - Repair or replacement - Sheet metal inspection - N.D.T. Testing - Riveted repair design, Damage investigation - reverse technology. **UNITII PLASTICSANDCOMPOSITESINAIRCRAFT** Reviewoftypesofplasticsusedinairplanes-Maintenanceandrepairofplasticcomponents-Repair o fcracks,holesetc.,variousrepairschemes-Scopes. Inspection and Repair of composite components - Special precautions - Autoclaves. **UNIT III AIRCRAFT JACKING, ASSEMBLYANDRIGGING** AirplanejackingandweighingandC.G.Location.Balancingofcontrolsurfaces-Inspectionmaintenance. Helicopterflightcontrols.Trackingandbalancingofmainrotor. **UNITIV REVIEWOFHYDRAULICANDPNEUMATICSYSTEM** Troubleshootingandmaintenancepractices-Serviceandinspection.-Inspectionandmaintenance oflandinggearsystems.-Inspectionandmaintenanceofair-conditioningandpressurisationsystem, waterandwastesystem.InstallationandmaintenanceofInstruments-handling-Testing Inspection.Inspectionandmaintenanceofauxiliarysystems-Fireprotectionsystems-Iceprotection system-Rainremovalsystem-Positionandwarningsystem-AuxiliaryPowerUnits(APUs) **UNITV SAFETYPRACTICES** Hazardousmaterialsstorageandhandling,Aircraftfurnishingpractices-Equipments.Troubleshooting - Theory and practices **TEXT BOOK** 1. KROES,WATKINS,DELP,"AircraftMaintenanceandRepair",McGraw-Hill,NewYork,1992.	

	REFERENCES 1. LARRYREITHMEIR,"AircraftRepairManual",PalamarBooks,Marquette,1992. 2. BRIMMD.J.BOGGESH.E.,"AircraftMaintenance",PitmanPublishingcorp. NewYork,1940.

Course no.	**AE ???**	
Course Title.	**TOTAL QUALITYMANAGEMEN**	
Credit.	**2Credit**	**Hours per week.(2 Lec+0Tut+?lab)**
Prerequisite.	**None**	
Course Description.	**UNITI INTRODUCTION** Definitionof Quality, Dimensionsof Quality, QualityPlanning,Qualitycosts-AnalysisTechniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership - Concepts, Role of Senior Management, Quality Council, Quality Statements, StrategicPlanning,DemingPhilosophy,BarrierstoTQMImplementation. **UNIT II TQMPRINCIPLES** Customer satisfaction - Customer Perception of Quality, Customer Complaints, Service Quality, CustomerRetention,EmployeeInvolvement-Motivation,Empowerment,Teams,Recognitionand Reward,PerformanceAppraisal,Benefits,ContinuousProcessImprovement-JuranTrilogy,PDSA Cycle,5S,Kaizen,SupplierPartnership-Partnering,sourcing,SupplierSelection,SupplierRating, RelationshipDevelopment,PerformanceMeasures-BasicConcepts,Strategy,PerformanceMeasure. **UNIT III STATISTICAL PROCESSCONTROL(SPC)** Theseventoolsofquality,StatisticalFundamentals-MeasuresofcentralTendencyandDispersion, PopulationandSample,NormalCurve,ControlChartsforvariablesandattributes, Processcapability, Conceptofsixsigma,NewsevenManagementtools. UNIT VI TQM TOOLS Benchmarking - Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD)-	

	HouseofQuality,QFDProcess,Benefits,TaguchiQualityLossFunction,TotalProductive Maintenance(TPM)-Concept,ImprovementNeeds,FMEA-StagesofFMEA. **UNIT V QUALITYSYSTEMS** Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System - Elements, ImplementationofQualitySystem,Documentation,QualityAuditing,QS9000,ISO14000-Concept, RequirementsandBenefits. **TEXT BOOK** 1.DaleH.Besterfiled,etal.,TotalQualityManagement,Pearson Education,Inc.2004. **REFERENCE BOOKS** 1. JamesR.Evans& William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western(ThomsonLearning),2002. 2. Feigenbaum.A.V."TotalQualityManagement",McGrawHill,2004. 3. Oakland.J.S."TotalQualityManagementButterworth",HeinemannLtd.,Oxford.2005. NarayanaV. and Sreenivasan, N.S. Quality Management - Concepts and Tasks, New Age International.

Course no.	**AE ???**	
Course Title.	**CIVILAVIATIONREQUIREMENTS-II**	
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**None**	
Course Description.	**UNIT I C.A.R.SERIES** C.A.R. series H - requirements of aircraft fuel, fuelling of aircraft and calibration: Aircraft fuels: Unusablefuelsupply-calibrationoffuelquantitygaugeofaircraft¡aircraftfuelingprocedures¡aviation fuelatairport-storage,handling&qualitycontrol. **UNIT II C.A.R. SERIES "I"&"L"** **C.A.R. series I - aircraft instruments, equipment and accessories:** Aircraft instruments overhaul and periodical inspections¡ aircraft equipment and instruments¡ maintenanceoftestequipments:airworthinessproceduresforcleanroomsandenvir	

onmentsfor aircraftsystems/accessoriesshop¡flightdatarecorders,Cockpitvoicerecorders¡GPWS¡installation ofairborne,Collisionavoidancesystem.

C.A.R. series L aircraft maintenance engineer - licensing: Issue of AME license, its classification and experience requirements, complete series L

UNIT III C.A.R.SERIES "M"&"O"

C.A.R. series M - mandatory modifications and inspections:

Mandatory modification / inspections.

C.A.R. series O - operational requirement for aircraft:

Minimum requirements to be complied by operators¡ operation of commercial air transport aero planes¡operationofgeneralaviationairplanes¡operationofcommercialairtransport helicopters¡ operationofgeneralaviationhelicopters¡registrationairworthinessandoperationofhandgliders and poweredhandgliders¡exitrowseating¡airworthiness,maintenanceandoperational requirements forextendedrangeoperationswithtwinengineaeroplanes¡requirementsforoperationofaircraftin MNPSairspace¡requirementsforpreparationofoperationsmanual.

Requirementsforimplementationofreducedverticalseparationminimum¡aircraftrequirementsrequired navigationperformance(RNP)/areanavigation(RNAV)Flighttestingof(series)aircraftforissueofCandA¡flighttestingonaircraftforwhichCandAhad beenpreviouslyissued.

inanaircraft¡use offurnishingmaterialsinaircraft¡concessions¡aircraftlogbooks¡documenttobecarriedonboard onIndianregisteredaircraft¡procedureofaircraftforissueoftaxipermit¡procedureforissueoftype approvalofaircraftcomponentsandequipmentincludinginstruments.

REFERENCES

1. Aircraftmanual(India)volume-latestedition,theEnglishbookstore,17-l,Connaughtcircus, NewDelhi.
2. Civil aviation requirements with latest amendment (section 2 airworthiness) - published by DGCA,theEnglishbookstore,17-l,Connaughtcircus,NewDelhi.
3. Aeronauticalinformationcirculars(relatingtoairworthiness)fromDGCA.AdvisorycircularsfromDGCA.

Course no.	**AE ???**	
Course Title.	**AEWINDTUNNELTECHNIQUES**	
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**None**	
Course Description.	**UNITI PRINCIPLESOFMODELTESTING** Buckingham Theorem - Non-Dimensional Numbers -Scale Effect Types of Similartes. **UNITII WINDTUNNELS** Classification - Special problems of Testing in Subsonic, Transonic, supersonic and hypersonic speed regions - Layouts - sizing and design parameters. **UNIT III CALIBRATION OFWINDTUNNELS** Testsectionspeed-Horizontalbuoyancy-Flowangularities-Turbulencemeasurements-Associated instrumentation-Calibrationofsupersonictunnels. **UNIT IV WINDTUNNELMEASUREMENTS** Pressureandvelocitymeasurements-Forcemeasurements-Threecomponentandsixcomponent balances-Internalbalances. **UNIT V FLOW VISUALIZATION** Smoke and Tuft grid techniques - Dye injection special techniques - Optical methods of flow visualization. **TEXT BOOK** 1. Rae,W.H.andPope,A."LowSpeedWindTunnelTesting",JohnWileyPublication,1914. **REFERENCE** 1. Pope,A.,andGoin,L.,"HighSpeedwindTunnelTesting",JohnWiley,1915	

Course no.	**AE ???**
Course	**FATIGUEANDFRACTUREMECHANICS**

Title.		
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**None**	
Course Description.	**UNIT I FATIGUEOFSTRUCTURES** S.N.curves-Endurancelimit-Effectofmeanstress-Goodman,GerberandSoderbergrelations anddiagrams-Notchesandstressconcentrations-Neuber'sstressconcentrationfactors-plastic stressconcentrationfactors-S-Ncurvesfortypicalnotchedgeometries. **UNIT II STATISTICAL ASPECTS OFFATIGUEBEHAVIOUR** Lowcycleandhighcyclefatigue-Coffin-Manson'srelation-Transitionlife-CyclicStrainhardening andsoftening-Analysisofloadhistories-Cyclecountingtechniques-Cumulativedamage-Miner's theory-othertheories. **UNIT III PHYSICAL ASPECTSOFFATIGUE** Phaseinfatiguelife-Crackinitiation-Crackgrowth-Finalfracture-Dislocations-Fatiguefracture surfaces. **UNIT IV FRACTUREMECHANICS** Strength of cracked bodies - potential energy and surface energy - Griffith's theory - Irwin - Orwin extension of Griffith's theory to ductile materials - Stress analysis of cracked bodies - Effect of thickness on fracture toughness - Stress intensity factors for typical geometries. **UNITV FATIGUE DESIGNANDTESTING** Safelifeandfailsafedesignphilosophies-ImportanceofFractureMechanicsinaerospacestructure - Application to composite materials and structures. **TEXT BOOKS** 1. PrasanthKumar-"Elementsoffracturemechanics"-Wheeterpublication,1999. 2. BarroisW,Ripely,E.L.,"Fatigueofaircraftstructure",Pergamonpress.Oxford,1913. **REFERENCES** 1. Sin,C.G.,"Mechanicsoffracture"Vol.I,SijthoffandwNoordhoffInternationalPublishingCo., Netherlands,1919. 2. Knott,J.F.,"FundamentalsofFractureMechanics",Buterworth&Co.,Ltd.,London,1913.	

Course no.	**AE ???**	
Course Title.	**AEROENGINEMAINTENANCE&REPAIR**	
Credit.	**2Credit**	**Hours per week.(2Lec+1 Tut+?lab)**
Prerequisite.	**None**	
Course Description .	**UNITI CLASSIFICATIONOFPISTONENGINECOMPONENTS** Typesofpistonengines-Principlesofoperation-Functionofcomponents-Materialsused-Details ofstartingtheengines-Detailsofcarburetionandinjectionsystemsforsmallandlargeengines-Ignitionsystemcomponents-Sparkplugdetails-Engineoperatingconditionsatvariousaltitudes-Maintenanceandinspectionchecktobecarriedout. **UNITII INSPECTION OFPISTONENGINES** Inspectionandmaintenanceandtroubleshooting-Inspectionofallenginecomponents-Dailyand routinechecks-Overhaulprocedures-Compressiontestingofcylinders-Specialinspectionschedules-Enginefuel,controlandexhaustsystems-Enginemountandsupercharger-Checksandinspection procedures. **UNIT III INSPECTION OF PISTON ENGINE** Symptoms of failure - Fault diagnostics - Case studies of different engine systems - 1: Tools and equipmentrequirementsforvariouschecksandalignmentduringoverhauling-Toolsforinspection- Tools for safety and for visual inspection - Methods and instruments for non destructive testing techniques - Equipment for replacement of part and their repair. Engine testing: Engine testing proceduresandschedulepreparation-Onlinemaintenance. **UNIT IV CLASSIFICATION OF JETENGINECOMPONENTS** 12Typesofjetengines-Principlesofoperation-Functionsofcomponents-Materialsused-Details ofstartingandoperatingprocedures-Gasturbineengineinspection&checks-Useofinstruments foronlinemaintenance-Specialinspectionprocedures:ForeignObjectDamage-Bladedamage- etc. Maintenanceproceduresofgasturbineengines-Troubleshootingandrectificationprocedures-Componentmaintenance procedures-System smaintenance procedures.	

	Gasturbinetestingprocedures-testschedulepreparation-StorageofEngines-Preservationand de-preservationprocedures. **UNIT V OVERHAULPROCEDURES** Engine Overhaul procedures - Inspections and cleaning of components - Repairs schedules for overhaul-BalancingofGasturbinecomponents.TroubleShooting-Proceduresforrectification-Conditionmonitoringoftheengineongroundandataltitude-enginehealthmonitoringandcorrective methods. **TEXT BOOK** 1. KROES&WILD,"AircraftPowerplants",7thEdition-McGrawHill,NewYork,1994. **REFERENCES** 1. TURBOMECA,"GasTurbineEngines",TheEnglishBookStore,NewDelhi, 1993. 2. UNITED TECHNOLOGIES PRATT &WHITNEY, "The Aircraft Gas turbine Engine and its Operation",(latestedition)The English Book Store ,New Delhi.

Course no.	**AE ???**	
Course Title.	**HELICOPTERMAINTENANCE**	
Credit.	**2Credit**	**Hours per week.(2 Lec+1Tut+?lab)**
Prerequisite.	**None**	

أولا: بيانات أعضاء هيئة التدريس لقسم الهندسة ميكانيكية طيران:

ر.م	اسم عضو هيئة التدريس	الجنسية	الدرجة العلمية	المؤهل العلمي			تاريخ التعاون	الصفة
				المؤهل	المؤسسة التعليمية المانحة للمؤهل	سنة الحصول عليه		
1	عبد الهادي بوزغيبة	ليبي	ماجستير	هندسة ميكانيكية	جامعة بنغازي	2020	2021	عضو هيئة تدريس قار
2	معاذ عوض فكرون	ليبي	ماجستير	هندسة ميكانيكية	جامعة بنغازي	2020	2021	عضو هيئة تدريس قار

3	النذير خلف الله	سوداني	ماجستير	هندسة طيران	جامعة كراري			عضو هيئة تدريس قار
4	المنتصر بالله عبدالسلام	سوداني	ماجستير	هندسة طيران	جامعة كراري			عضو هيئة تدريس قار
5	عبدالله عوض الله	سوداني	ماجستير	هندسة طيران	جامعة كراري			عضو هيئة تدريس قار
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15								
16								
17								

ثانيا: بيانات الطلاب المسجلين لهذا الفصل بقسم الهندسة ميكانيكية طيران:

عدد الطلاب الدارسين بفصل الخريف 2021م	تخصص48\ عام 66 طالب
عدد الطلاب إيقاف القيد لهذا الفصل	طلاب1
عدد الطلاب الذين قاموا يسحب ملفاتهم لفصل الخريف 2021م	14 طلاب
اجمالى عدد الطلاب المسجلين بالقسم	114 طالب

ثالثا : بيانات الموظفين بالقسم .

ت	الاســـــــم	المؤهل العلمي	الصفة	نوع العقد
1		كابتن طيران	منســـــق قسم الدراسة و الامتحانات	
2		بكالوريوس هندسة كيميائية	منسق إداري	
3	سهي إبراهيم على	بكالوريوس هندسة طيران	منسق الجود وتقيم الأداء بالقسم	متعاون
4	نواره احمد حامد	بكالوريوس هندسة طيران	منسق أعضاء هيئة التدريس بالقسم	متعاون

رابعا: معامـــــل القســـــــم.

المعامل

AIRCRAFT STRUCTURES LABORATORY(2 HOURS/WEEK)

GOAL The objective of conducting the Aircraft structure laboratory is to make the students understand and appreciate various principle and theorems involved in the theory of aircraft structures, vibrations and experimental stress analyzing the results. This will immensely help

the students to enrich their knowledge in the design of various aircraft structural components, namely, wings, fuselage, landing gear, control surfaces, etc.

LIST OF EXPERIMENTS

1.Determination of Young's modulus of steel using mechanical extensometers. 2.Determination of Young's modulus of aluminum using electrical extensometers.3.Deflection of beams with various end conditions.
4.Verification of Maxwell's Reciprocal theorem & principle of superposition.
5. Column - Testing and South - well's plot. 6.Shear centre location for open sections and closed sections7.Unsymmetrical bending of beams8.Stresses in circular discs and beams using photoelastic techniques9.Vibrations of beams10.Wagner beam - Tension field beam

LIST OF EQUIPMENTS

Sl. No.	Equipments	Qty	Experiment
1.	Mechanical Extensometer		1
2.	Electrical strain gauge		2
3.	Strain indicator		2
4.	Dial Gauges		1,2,4,5,6,7
5.	Beam Test set up with various end		3
6.	Weight 1 Kg		1,2,4,5,6,7
7.	Weight 2 Kg		1,2,4,5,6,7
8.	Weight Pans		8
9.	Column Test Apparatus		5
10.	Beam Test set -up		3
11.	Unsymmetrical sections like 'Z' sections		7
12.	Channel section and angle section		6
13.	Strain indicator and strain gauges		3,9,10
14.	Photo - elastic apparatus		8
15.	Amplifier		9
16.	Exciter		9
17.	Pick - up		9
18.	Oscilloscope		9
19.	Wagner beam & Hydraulic Jack		10

AERODYNAMICS LAB(2 HOURS/WEEK)

GOAL To study experimentally the aerodynamic forces on different bodies at low speeds

LIST OF EXPERIMENTS

1.Calibration of subsonic wind tunnel.2.Pressure distribution over smooth and rough cylinder. 3.Pressure distribution over symmetric airfoil. 4.Pressure distribution over cambered airfoil& thin airfoils. 5.Force measurement using wind tunnel balance. 6.Flow over a flat plate at different angles of incidence. 7.Flow visualization studies in low speed flow over cylinders.
8.Flow visualization studies in low speed flow over airfoil with different angle of incidence.
9.Calibration of supersonic wind tunnel. 10.Supersonic flow visualization with Schlieren system.

LIST OF EQUIPMENT

Sl.No	Items	Qty	Experimen
1.	Wind Tunnel test section size around 300 x 300 mm with test section flow speed of 70 m/s.		1, 2,3,4,5
2.	Wings of various airfoil sections (Symmetrical & cambered airfoils)		3, 4
3.	Angle of incidence changing mechanism		3, 4
4.	Multiple Manometer stands with 20 - 30 manometer tubes		2,3,4
5.	U-Tube Manometer		1,2,3,4
6.	Static Pressure Probes		1,2,3,4
7.	Total Pressure Probest		1,2,3,4
8.	Pitot-Static Tubes		1,2,3,4
9.	Wooden Models of Three Dimensional bodies (eg. Cylinder etc.,)		2
10.	Wind Tunnel balances (3 or 5 or 6 components)		5
11.	Pressure Transducers with digital display		1,2,3,4
12.	Hele-Shaw apparatus, Smoke Tunnel, Water flow channel		6,7,8
13.	Supersonic Wind tunnel of test section size 100x100mmwithstoragetankcapacityof 500ft2at20bar		9,10
14.	Wooden models of cone, wedge and blunt body configurationsofsuitablesizeforflowvisualization inasupersonicwindtunneltestsection		9,10
15.	Schlieren System		9,10

PROPULSION LAB (2 HOURS/WEEK)

GOAL To understand concepts of aircraft propulsion and carry out experiments

LIST OF EXPERIMENTS

1.Study of an aircraft piston engine and jet engines and its components.
2.Study of forced convective heat transfer.
3.Study of free convective heat transfer.
4.Cascade testing of a model of axial compressor blade row.
5.Determination of heat of combustion of aviation fuel.
6.Combustion performance studies in a jet engine combustion chamber.
7.Study of free jet.
8.Study of wall jet

LIST OF EQUIPMENTS

Sl.No	Equipment	Qty	Experiments
1	Piston engines		1
2	Jet Engine /Engine model		2
3	Forced Convective apparatus		3
4	Free Convective apparatus		4
5	Bomb calorimeter		5
6	Free jet Apparatus		7, 8
7	Low speed wind tunnel		4

AIRCRAFT STRUCTURAL REPAIR LAB(2 HOURS/WEEK)

GOAL To give training on riveting, patchwork and welding

LIST OF EXPERIMENTS1. Sheet Metal Forming.
2. Lap Joint by MIG Welding.
3. Butt Joint by TIG Welding.
4. Lap Joint by Riveting.
5. Butt Joint by Riveting.
6.Surface Patch Repair by Riveting (Using Pneumatic Gun).
7.Control cable inspection and repair.
8.Repair on Perspex glass panels.

9.Pipe flaring.
10.Composite Materials - Fabrication and Repair.

LIST OF EQUIPMENT

S.No.	Name of the Equipment	QTY	Experiment
1	Shear cutter pedestal type		1,4,5,6
2	Drilling Machine		4,5,6,8
3	Bench Vices		2,3,4,5,6,8
4	Radius Bend bars		1
5	Pipe Flaring Tools		9
6	MIG Weld Plant		2
7	TIG Weld Plant		3
8	Pneumatic Riveting Gun		6
9	Composite Molding Machine		10

AIRCRAFT SYSTEM LABORATORY(2 HOURS/WEEK)

GOAL To get the practical knowledge and "On-HAND" experience in maintenance of various aircraft systems and common snags rectification procedure un various aircraft system.

LIST OF EXPERIMENTS

1. Aircraft" Jacking Up" procedure
2. Aircraft "Leveling" procedure
3. Control System" Rigging check" procedure
4. Aircraft" Symmetry Check" procedure
5. "Flow test "to assess of filter element clogging
6. "Pressure Test" To assess hydraulic External/Internal Leakage
7. "Functional Test" to adjust operating pressure
8. "Pressure Test" procedure on fuel system components
9. "Brake Torque Load Test" on wheel brake units
10. Maintenance and rectification ofsnagsin hydraulic and fuel

LIST OF EQUIPMENTS

S.No.	Items	Quantit	Experiment No.
1.	Serviceable aircraft with all above		1,2,3,4,5,6,7,1,9,

2.	Hydraulic Jacks (Screw Jack)		1,2,4,1
3.	Trestle adjustable		1,2,4,1
4.	Spirit Level		1
5.	Leveling Boards		1
6.	Cable Tensiometer		1
7.	Adjustable Spirit Level		1
8.	Plumb Bob		1

DESIGN AND DRAFTING LAB(2 HOURS/WEEK)

GOAL To introduce the concept of design of basic structural components and to draft both manually and using modeling package.

LIST OF EXERCISES

1.Designofrivetedjoints(Lap joint)

2.Designofrivetedjoints(Butt joint with single and double straps).

3.Designofweldedjoints.

4.Layoutoftypicalwingstructure.

5.Layoutoftypicalfuselagestructure.

6.Computeraided modeling of typical aircraft wing.

7.Computeraided modeling of typical fuse lag structure.

8.Computeraided modeling of landing gear

9.Threeviewdiagramofatypicalaircraft

10.Layout of control systems

LIST OF EQUIPMENT

S.No	Equipments	Quantit	Experiments No.
1	Drawing Boards, Drafting		1 -
2	Computer and modeling software		6 - 10

AVIONICS LABORATORY(2 HOURS/WEEK)

GOAL This laboratory is divided into three parts to train the students to learn about basic digital electronics circuits, programming with microprocessors, design and implementation of data buses in avionics with MIL - Std. 1553-B and remote terminal configuration and their importance in different applications in the field of Avionics.

LIST OF EXPERIMENTS

DIGITALELECTRONICS

1. Addition/Subtraction of binary numbers.
2. Multiplexer/Demultiplexer Circuits.
3. Encoder/Decoder Circuits.
4. Timer Circuits ,Shift Registers , Binary Comparator Circuits.

MICROPROCESSORS

5. AdditionandSubtractionof8-bitand16-bitnumbers.
6. Sorting of Data in Ascending & Descending order.
7. Sum of a given series with and without carry Greatest in a given series & Multi-byte addition in BCD mode.
8. Interface programming with 4 digit 7 segment Display & Switches & LED's.
9. 16 Channel Analog to Digital Converter & Generation of Ramp, Square, Triangular wave by Digital to Analog Converter.
10. AVIONICS DATA BUSES
11. Study of Different Avionics Data Buses.
12. MIL-Std - 1553 Data Buses Configuration with Message transfer.
13. MIL-Std - 1553 Remote Terminal Configuration.

LIST OF EQUIPMENT

S.No.	Details of Equipments	Quantit	Experiment
1.	Adder/Subtractor Binary bits Kit	6	1
2	Timer Kit	6	1
3	Encoder Kit	6	3
4	Decoder Kit	6	3
5	Comparator Kit	6	4
6	Multiplexer Kit	6	2
7	Demultiplexer Kit	6	2
8	Shift Registers Kit	6	4
9	Microprocessor 8085 Kit	9	5,6,7,8,9
10	4 Digit 7 Segment Display	3	9
11	Switches & LED's Circuit	3	9
12	16 Channel AD Converter	6	10
13	Digital to Analog Converter	6	10
14	Cathode Ray Oscilloscope	3	9,10
15	Regulated Power Supply (5V DC)	9	1, 2,3,4
16	MIL-Std 1553B Setup with Remote	1	12,13

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17	Computers	2	11,12,13

AERO ENGINE REPAIR & MAINTENANCE LABORATORY(2 HOURS/WEEK)

GO Alto make the students to understand the maintenance and repair procedures of both Piston and Gas Turbine Engines and their procedures followed for overhaul of aero engines.

LIST OF EXPERIMENTS

1. Stripping of apiston engine
2. Engine (Piston Engine)-cleaning,
3. Piston Engine Components-dimensional checks.
4. Piston - Engine reassembly.
5. Propeller Pitch Setting
6. Stripping of a jet engine
7. Jet Engine-identification of components &defects.
8. Jet Engine-NDT checks and dimensional checks
9. Jet Engine -reassembly.
10. Engine starting procedures

LIST OF EQUIPMENTS

Sl.No	Equipments	Qty	Experiments No.
1	Piston Engines		1,2,3,4
2	Jet Engines		6,7,1,9
3	Propeller pitch setting stand		5
4	Aircraft with serviceable stand		1 to 10
5	Precision instruments (VernierCaliper, Micrometer,Cylinderboregauge,depthgauge, BevelProtectorandDTI		3,5,1

6	NDT Equipments(Defect scope, Dyepenetrant method, Hot oil Chalk Method		2,1

Head of Aeronautical Engineering

Department

الخطة الإستراتيجية لقسم هندسة ميكانيكا الطيران

قيم القسم :

1- الجودة والتحسين المستمر
2- العمل الجماعي
3- الثقة والاحترام المتبادل

رؤية القسم :

أن يكون القسم متميزاً في التعليم و البحث في هندسة ميكانيكا الطيران.

رسالة القسم :

إعداد مهندسين على درجة عالية من الكفاءة والقيادة في مجالات المعرفة والتصميم والتطبيق وتشغيل أنظمة هندسة الطيران.

أهداف القسم :

2- إن الأهداف التعليمية لبرنامج هندسة الطيران في جامعة النجم الساطع هي إعداد خريجين قادرين على الانخراط في الحياة المهنية في المجالات المختلفة: الصناعية، والعسكرية ، و الأكاديمية ،و البحثية مخرجات القسم التعليم

ل- تطبيق المعرفة في الرياضيات والعلوم الأساسية ومبادئ الهندسة في حل المشاكل الصناعية.
م- تصميم وتطوير وتطبيق التجارب الهندسية وتحليل البيانات المخرجة.
ن- تصميم الأنظمة وأجزائها أو تصميم العمليات التي تفي بالغاية المطلوبة.
س- تشكيل فرق عمل للمشاريع الصفية ومشاريع التخرج والمشاركة الفعالة في الفريق وتطبيق مهارات إدارة الوقت.
ع- نمذجة المشاكل الهندسية باستخدام نماذج رياضية محوسبة والخروج بحلول وتصميم للمتحكمات لديمومة الفاعلية. تشخيص المشاكل الصناعية وطرح الحلول لاستمرار التطوير.
ف- تطبيق معايير بأخلاقيات و مهنية مهندس الطيران.
ص-كتابة التقارير التقنية وإلقاء الأطروحات المحترفة باستخدام أحدث التقنيات. ممارسة التواصل مع الصناعة ومهارات التفاعل الإيجابي في الفريق.
ق- إدراك أثر الحلول الهندسية في الصناعة والمجتمع والبيئة.

ر- إظهار القدرة على البحث عن المعلومة والمواكبة وتحصيل تعليم إضافي مستمر.
ش- مواكبة أحدث التقنيات والتقدم في المجالات المرتبطة بهندسة الطيران والهندسة بشكل عام بمساعدة أحدث مصادر المعرفة.
ت- تطبيق التقنيات المدروسة والأدوات الحديثة والمهارات لحل المشاغل الهندسية